UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

E/CN.17/IPF/1996/4
21 February 1996

ORIGINAL: ENGLISH

COMMISSION ON SUSTAINABLE DEVELOPMENT
Ad Hoc Intergovernmental Panel on Forests
Second session
11-22 March 1996
Item 2 of the provisional agenda*

IMPLEMENTATION OF FOREST-RELATED DECISIONS OF THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT AT THE NATIONAL AND INTERNATIONAL LEVELS, INCLUDING AN EXAMINATION OF SECTORAL AND CROSS-SECTORAL LINKAGES

Programme element I.5: Needs and requirements of countries with low forest cover

Report of the Secretary-General

SUMMARY

The present report focuses on the needs and requirements of countries or areas with low forest cover (LFCs). Several definitions of forest and low forest cover have been used; however, for the purposes of the report, the FAO global forest resource assessment data sets are used, namely 20 per cent minimum crown cover in developed countries and 10 per cent cover in developing countries.

While most definitions of low forest cover are based on land area and percentage canopy cover, the present report argues that the key issue is the scarcity of forest goods and services that are available to support sustainable development, so that area of forest per capita and security in the provision of forest goods and services are the key indicators.

* E/CN.17/IPF/1996/1.

96-03178 (E) 280296 010396

/...

Nearly 75 per cent of the world's countries have less than one hectare of forest cover per inhabitant.

The factors that contribute to low forest cover are:

(a) Low original endowment;

(b) Historical deforestation;

(c) Current pressures on land use.

However, the relative importance of these factors varies both among countries and within countries.

FAO statistics show that forest loss in most of LFCs is low (less than 1 per cent). However, pressures are greatest on countries that have a low forest cover per capita, due primarily to the demand from a wide range of stakeholders for forest goods and services, such as fuel, fodder, timber, and in some cases agricultural land. In such instances, land tenure is also an important issue.

Unique forests are forests that provide a habitat for a significant number of species (centres of biological diversity), as well as forests that provide special goods and services to the communities that depend on them.

In general, the level of protection in the LFCs is low, with a mean of only 3.6 per cent, compared with a global mean of 6 per cent of forest. However, countries should make their own decisions and commitments on the areas to be protected.

In producing the present report, a shortage of information has been identified on the availability of forest-derived goods and services per person, both nationally and in global terms.

The information that is available is often deficient in terms of the topics covered, frequency, measurement of land area, quality and usefulness. While there have been several initiatives at the national and international levels to improve the collection, analysis and availability of information, there is perhaps a need for a more systematic approach, such as through forest resource assessment.

The challenge is to achieve security in forest goods and services for each person, each nation and the globe. The priority, therefore, should be for stakeholders to agree which goods and services are scarce and how to both improve and sustain their supply.

These issues can only effectively be addressed at the national level, where the options would seem to be:

(a) Developing and managing forests;

(b) Obtaining forest goods and services from agricultural and other non-forest land use;

(c) Importing forest goods and services from elsewhere;

(d) Identifying and promoting substitutes for them.

The selection and combination of options will inevitably vary with economic and social conditions and at the local, national and international levels. However, a key issue is ensuring access to up-to-date and relevant information on the current situation, the needs of stakeholders and options for the supply of forest goods and services.

The report suggests that countries may wish to consider setting up national mechanisms, such as forest/forest industry stakeholders' forums, to consider options, exchange information, generate new ideas, help identify and tackle cross-sectoral and other complex issues, and build a consensus for action.

In conclusion, the present report notes the diversity of LFCs and emphasizes that global solutions can only be derived from analyses, consensus and action that are formulated at the national level.

CONTENTS

	Paragraphs	Page
INTRODUCTION	1 - 6	6
I. LOW FOREST COVER	7 - 17	6
A. Definition of the term "forest"	7 - 9	6
B. Countries with low forest cover	10 - 14	8
C. Factors contributing to low forest cover	15 - 17	9
II. CURRENT TRENDS	18 - 42	11
A. Goods and services	22 - 27	12
B. Unique forests	28 - 35	14
C. Protected areas	36 - 42	16
III. INFORMATION REQUIREMENTS	43 - 46	18
IV. APPROACHES AND POLICY OPTIONS	47 - 72	19
A. Options	47 - 66	19
B. Criteria for selecting and balancing options	67 - 72	22
V. CONCLUSIONS AND PRELIMINARY PROPOSALS FOR ACTION	73 - 76	24
A. Conclusions	73 - 74	24
B. Preliminary proposals for action	75 - 76	24

Figures

1a. Numbers of countries in classes of forest cover	29
1b. Numbers of countries in classes of percentage of land covered by forest and other wooded land	29
1c. Numbers of countries in classes of per capita forest cover	29
2. Processes for achieving security of forest goods and services	30

CONTENTS (continued)

Maps*

1. Percentage of land area under forest and other wooded land

2. Forest cover per capita

3. Distribution of least forested countries by major eco-regional domains

---

* The maps will be made available to the Panel.

The boundaries shown on the maps do not imply official endorsement or acceptance by the United Nations.

INTRODUCTION

1. The present report covers element I.5, "Needs and requirements of countries with low forest cover", of the programme of work of the Ad Hoc Intergovernmental Panel on Forests.

2. The preparation of the report was guided by decisions taken by the Commission on Sustainable Development at its third session and further elaborated by the Panel at its first session.

3. The Commission defined programme element I.5 as a need to propose measures for addressing the needs and requirements of developing countries and other countries with low forest cover in order to promote activities to conserve existing forest cover, with particular attention to unique forests.

4. At its first session, the Panel emphasized the need to prepare a report on the specific needs of countries with low forest cover, particularly developing countries and other countries with low forest cover, in order to promote activities to conserve existing forest cover, with particular attention to unique forests. The report should consider particular situations in which communities and forest dwellers depend on forests to meet their subsistence needs, such as fuel, food, forage, grazing provisions for livestock, shelter and medicinal plants, and should also identify areas of low forest cover, protected forests and dry woodlands.

5. The present report was prepared by the United Nations Environment Programme, as lead agency for programme element I.5, in consultation with the Panel secretariat in the Division for Sustainable Development of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat. The report is based on a study prepared by the Overseas Development Agency of the Government of the United Kingdom of Great Britain and Northern Ireland.

6. The report focuses on the needs and requirements of countries or areas with low forest cover (LFCs), including developed and developing countries. The report considers what is meant by low forest cover in terms of the scarcity of the goods and services provided by forests, explores the reasons for low forest coverage, and attempts to identify LFCs based on current global statistics; presents an overview of the current status of forest resources and values in LFCs; and identifies gaps in the information available and some options for promoting the security of forest goods and services within LFCs.

I. LOW FOREST COVER

A. Definition of the term "forest"

7. The term "forest" encompasses an enormous range of natural and man-made ecosystems that may differ in almost all their characteristics, save that they consist primarily of trees. A major problem in defining a forest is how to determine the threshold at which tree cover becomes sufficiently dense to

constitute a forest rather than, say, open woodland. A number of vegetation classification systems distinguish forests from other woody formations by applying such thresholds (see box 1).

Box 1. Definitions of forest cover

UNESCO	Closed forest	Trees greater than or equal to 5 metres tall, with crowns interlocking
	Woodland	Trees greater than or equal to 5 metres tall, with crowns not usually touching but with canopy cover greater than or equal to 40 per cent
United States classification	Closed tree canopy	Trees with crowns interlocking, with crowns forming 60 to 100 per cent cover
	Open tree canopy	Trees with crowns not usually touching forming 10 or 25 to 60 per cent cover
FAO	Forest (developing countries)	Ten per cent crown cover of trees and/or bamboos
	Forest (developed countries)	Tree crown cover (stand density) of more than 20 per cent of the area
	Other wooded land (developing countries)	Includes forest fallow, shrubs
	Other wooded land (developed countries)	Includes open woodland (tree crown cover 5 to 20 per cent), scrub, brushland, exploitable forest
	Closed forest (tropical countries)	Tree crown cover greater than 40 per cent

8. The scarcity of forest products (wood and non-wood, commercial and non-commercial) and forest services may be felt most keenly in forest-poor countries, especially developing countries; such is the source of concern about low forest cover: in many developing countries, an increasing number of people rely for their daily subsistence on overutilized forest resources that are dwindling at an alarming rate.

9. The scarcity of forest goods and services must be assessed on various scales, since different goods or services are important at different levels in society (e.g., individual, national and global). However, no integrated data on

forest goods and services are widely available. As a result, for the purposes of the present report it has been necessary to estimate data based on forest cover, even though forest cover may not accurately reflect the availability of forest goods and services because in many cases these may be provided by other land covers, and forest cover does not reflect the accessibility of such goods and services since this might be affected by issues of forest ownership or land tenure. However, the datasets contained in the global forest resource assessment of the Food and Agriculture Organization of the United Nations (FAO), do provide the most standardized basis available on which to assess the forest resources of individual countries.

B. Countries with low forest cover

10. The extent of forest area is strongly influenced by the definition used: a low threshold for canopy cover can result in the inclusion of woody vegetation not normally regarded as forest (see box 2).

Box 2. Sample effects of using different forest definitions

Senegal is 40 per cent forested using the FAO 10 per cent tree cover definition, which includes dry woodland, but it is only 2 per cent covered by closed forest.

Australia is 5 per cent forested according to the FAO 20 per cent tree cover threshold but it is only 0.4 per cent covered by dense forest (with greater than 70 per cent canopy cover).

11. The analyses in the present report are based on FAO forest definitions of a minimum crown cover of 20 per cent in the developed countries and 10 per cent in the developing ones. Although they are not truly comparable across the globe, these statistics are the only ones available for all forested countries.

12. For any given definition of forest, national forest cover can be assessed in terms of the percentage of area covered, area of forest cover per capita or proportion of world forest resources contained within the country, among other measures. Which assessment of cover is most useful will depend on the purpose of the assessment; for example, where the concern is land cover and the services that are provided by forests as land cover, such as soil and watershed protection, habitat or carbon storage, forest cover as a percentage of total land area is the measure of interest.

(a) Of the countries or areas covered in the FAO forest resource assessment, more than 25 per cent have less than 7 per cent of their land under forest cover, and 50 per cent are less than 25 per cent forested (see figure 1a);

(b) If other wooded land is included, the 45 LFCs have less than 19 per cent of their land area under woody cover, and 50 per cent of LFCs are less than 40 per cent forested in this broader sense (see figure 1b and map 1).

13. The ability of a nation's forests to supply goods and services to its inhabitants may be better assessed in terms of forest cover per capita. For example:

(a) Nearly three quarters of the world's countries have less than one hectare (ha) of forest cover per inhabitant (see figure 1c). Approximately 25 per cent of the countries or areas covered by the FAO forest resource assessment (FAO, 1995) have less than 0.07 ha of forest per capita, and 50 per cent have less than 0.25 ha per capita (see map 2);

(b) The inclusion of other wooded land vastly increases the area of forest cover per capita in some countries, though not in others, with 58 countries or areas having less than 2 ha of forest and other wooded land per capita.

14. The 25 per cent of countries or areas included in the FAO forest resource assessment (FAO, 1995) that have the least forest cover according to each of these criteria are listed in the table in order of forest cover. Many countries or areas fall into the least forested group based on all three criteria mentioned in paragraph 12 above, although some do appear under only one or two criteria. Comparison between the columns in the table highlights the differences among LFCs. For example, countries that have small areas of forest cover but also small populations, such as Afghanistan, LFCs are based on forest cover but not based on forest per capita. Similarly, countries that have relatively large areas of woody scrub and other wooded land, such as Australia and Kenya, are LFCs based on forest cover but not based on forest cover and other wooded land.

C. Factors contributing to low forest cover

Low original endowment

15. Many of the LFCs listed in the table are located in the arid regions of the world, which are climatically unsuited to support forest cover (see map 3). In these countries, what forests there are may be restricted to pockets of more favourable growing conditions, such as fog-bound mountain tops or oasis areas with high water tables. Polar conditions also restrict original forest cover for a few countries, such as Iceland.

Table. Countries or areas with least forest cover, based on area under forest cover, area under forest and other wooded cover, area of forest per capita

	LFC based on				LFC based on		
Country or area	Area under forest (canopy greater than 10 per cent)	Area under forest or other wooded cover	Area of forest per capita	Country or area	Area under forest (canopy greater than 10 per cent)	Area under forest or other wooded cover	Area of forest per capita
American Samoa	*	*	*	Afghanistan	*	*	
Bahrain	*	*	*	Niger	*	*	
Barbados	*	*	*	Kenya	*		*
Bermuda	*		*	Pakistan	*	*	*
Cayman Islands	*		*	Saint Helena	*		
French Polynesia	*		*	Tunisia	*	*	
Guam	*	*	*	Cape Verde	*		*
Iceland	*	*	*	Uruguay	*	*	
Kiribati	*	*	*	Comoros	*	*	*
Netherlands Antilles	*	*	*	Israel	*	*	*
Niue	*		*	Australia	*		
Oman	*	*	*	Morocco	*	*	
Pacific Islands	*		*	Ireland	*	*	
Qatar	*	*	*	Mauritius	*		*
Saint Pierre et Miquelon	*	*	*	Mongolia	*		
Tonga	*	*	*	El Salvador	*		*
Yemen	*	*	*	Singapore		*	*
Egypt	*	*	*	Bangladesh		*	*
Saudi Arabia	*	*	*	Netherlands		*	*
Iraq	*	*	*	Lebanon		*	*
Libyan Arab Jamahiriya	*	*		Saint Lucia			*
Lesotho	*	*	*	Rwanda			*
Kuwait	*	*	*	United Kingdom		*	*
Mauritania	*	*		Seychelles		*	*
Jordan	*	*	*	Burundi			*
United Arab Emirates	*	*	*	Belgium			
Algeria	*	*		Swaziland		*	
Djibouti	*		*	Denmark		*	
Iran	*	*	*	Ukraine		*	
Haiti	*	*		China		*	
Somalia	*			Hungary		*	
Syrian Arab Republic	*	*		Bahamas		*	
				Argentina		*	

Note: Countries and areas are listed in order of increasing forest cover.

Deforestation in the past

16. Many LFCs were deforested by exploitation before the twentieth century: the fate of their forests depended upon a combination of factors related to climate, location and control, as well as on demands for agricultural lands and forest products, which in turn were related to population trends and institutional controls. The forests of the United Kingdom and of Ireland underwent a phase of depletion during the seventeenth to nineteenth centuries, when they were used to supply the shipbuilding industry. The Mediterranean region was severely deforested during classical times by the exploitation of fuel and timber. War and instability have also been blamed for the decline of forests: Lebanon lost 60 per cent of its forests in the first three years of the First World War.

Current pressures on land use

17. A few LFCs once had a substantial endowment of original forest that has been depleted more recently by exploitation and demands for conversion to other land uses (see E/CN.17/IPF/1996/2). This is particularly true of countries in which the total land area per capita is relatively restricted so that the possibilities of expanding onto non-forested land are reduced. Islands are a classic example: there the scope for expansion and exploitation of alternative sources of forest goods and services is absolutely restricted; 23 of the 65 countries or areas listed in the table are islands.

II. CURRENT TRENDS

18. FAO records deforestation rates of zero for most of the LFCs listed in the table, with an average loss of natural forest of less than 1 per cent for those LFCs for which data is available. These low rates of forest clearance may reflect several factors, such as:

(a) FAO does not record forest clearance in LFCs whose area of forest cover falls below the minimum threshold;

(b) LFCs probably value their forests highly;

(c) Remnant forests are often very well protected, either legally or by their location in areas that are inaccessible or otherwise undesirable for other land use.

19. The pressures on remaining forests, however, may be quite intense, especially in countries with low forest cover per capita. In Pakistan, annual growth in the 1980s accounted for only 62 per cent of the annual wood harvest (Biswas, 1987, cited in Mather, 1990). Demands for fuel and fodder are especially intense in such areas and may be less easily controlled by legal instruments due to problems of accessibility.

20. Some LFCs have actually been increasing their forest cover in recent years through reforestation and afforestation programmes, and LFCs had an average net increase of 0.3 per cent in natural and plantation forest area over the

1980-1990 period, compared with a net forest loss worldwide of between 0.1 and 0.2 per cent. In general, LFCs have a greater percentage of their forest resource in plantation (24 per cent vs 10 per cent for the world). Plantations can improve the availability of forest goods and services, but since they are frequently monocultures of exotic species they may make little or no contribution to protecting indigenous biological diversity.

21. In the past, the main focus for discussions on forest conservation has been on countries with relatively high forest cover. Increasingly, the importance of forest management in LFCs has been recognized: a number of LFCs have developed national forestry action programmes and most have ratified the Convention on Biological Diversity. Few of them, however, have produced national biodiversity action plans.

A. Goods and services

22. As already discussed, forests provide a wide range of goods and services (see box 3); in LFCs, a high proportion of such goods and services are likely to derive from other wooded land, farmland or plantations.

23. LFCs with low forest cover as a percentage of their total land area are generally net importers of timber or timber products. El Salvador, for example, imports 80 per cent of the annual requirement of its wood-based industries (250,000 cubic metres (m^3)) from other Central American countries. Kenya has banned the export of unprocessed indigenous hardwood timbers since 1983, and imports hardwood.

24. LFCs may export small quantities of speciality timbers from species, such as Dalbergia spp and Diospyros spp, but it is difficult to obtain information on levels of trade.

25. Wood is the major energy source in many countries, including LFCs. For example, it has been estimated that fuelwood from trees and shrubs accounts for over 60 per cent of Lesotho's energy requirements. In El Salvador, the annual consumption of forest products for energy production is estimated at 4.9 million m^3. And the predominant use of wood in Haiti is for fuel, with 75 per cent of the country's energy consumption provided by biomass. Acute fuelwood scarcity is a major global problem and is of particular concern in LFCs.

26. In addition to roundwood and fuelwood, forests and woodlands contribute very significantly to local and national economies through non-wood forest products (NWFPs). These are particularly important to the people living in and around the forests, but since this process is an informal and often a barter system it is difficult to record and is not generally reflected in national statistics. NWFPs may be highly significant commercial resources in local economies or may be export commodities from LFCs.

27. In LFCs, forests may be important sources of foodstuffs, both for local consumption and for export. They also play important roles in protecting the genetic resources of important crop species.

Box 3. National importance of wood resources and other forest products

In Kenya, more than 75 per cent of the energy used comes from fuelwood and charcoal. The contribution to the economy of fuelwood and other forest products, such as honey, gum, food, medicine and leaves, has not been assessed, but such products undoubtedly add to the importance of Kenya's forest resources. Timber is one of the most important products derived from Kenya's forests. Current demand for indigenous timber, however, far exceeds its legal available supply.

Although Somalia has a very low percentage of forest cover, over 50 per cent of the country has tree cover generally in the form of open savanna. Important uses of trees include for fuelwood, hut construction, livestock enclosures and fodder. It has been estimated that forests contribute about 6 per cent of Somalia's gross domestic product (GDP). This figure would be substantially higher if the products and services provided by trees to other sectors of Somalia's economy, such as water-resource maintenance, the provision of fodder, fuelwood and edible products, were taken into account.

Barbados has 2 per cent of its land area under some form of tree cover. Tree harvesting for industrial purposes is undertaken by one company integrated directly with the furniture industry. Harvesting consists of the selective removal of native mahogany trees. There are 57 companies on the island involved in the manufacture of wooden products, which contributed some US$ 4.2 million to GDP and 5 per cent of employment in the manufacturing sector in 1989. A significant handicraft industry also uses wood and non-wood products.

Pakistan's limited forest resources fall into two categories: production forests (27.6 per cent), which are potentially for timber extraction, and protection forests (72.4 per cent), the main function of which is to protect soil and water resources. Irrigated plantations cover nearly 0.23 million ha in the plains of Pakistan. Established over 100 years ago, they are managed for fuelwood and timber for furniture and wood-based industries. Farmland produces more timber than forest reserves.

Sources: FAO; Marshall and Jenkins (1994); IIED (1992).

B. Unique forests

28. Unique forest ecosystems are especially important for biodiversity conservation. They may be areas with significant numbers of unique (that is endemic) species, or they may be areas with unique communities or associations of non-endemic species. Generally, more information is available on the occurrence of endemic species than on unique communities. Two global-level measures of endemism that give a good indication of important areas and unique ecosystems are endemic bird areas and centres of plant diversity.

29. The occurrence of endemic bird areas (EBAs) - areas that contain at least two bird species whose whole range is less than 50,000 square kilometres (km^2) - (Bibby and others, 1992) may serve as an alternative way to identify areas with unique ecosystems that have notable numbers of endemic species. EBAs have been roughly categorized into different habitat types. Some 21 EBAs with forest (either all forest or mixed) occur in LFCs, of which 15 are entirely confined to LFCs. These EBAs particularly the 11 given priority-one rating by BirdLife International in their analysis of EBAs (Bibby and others, 1992), can be considered likely to include a high proportion of the major conservation priorities among forest areas in LFCs.

30. The World Wide Fund for Nature (WWF) and The International Union for the Conservation of Nature (IUCN) are in the process of completing a major project to identify global centres of plant diversity (WWF and IUCN, 1994). Some 234 sites have been chosen worldwide for data-sheet treatment, although a large number of other areas also meet the selection criteria. Of the sites chosen, 28 are wholly or partially within the 49 LFCs, although at least three of these are non-forest sites. Ten of the 28 sites are in Australia and seven in the Middle East, the latter being an area with no EBAs. However, a notable number of LFCs in the Pacific and Caribbean regions are included in the regions that meet the criteria for a centre of plant diversity but do not have data sheets.

31. Unique or rare forest ecosystems that are not comprised of significant numbers of endemic species are more likely to be found in areas that previously had more continuous forest cover but in which forest cover has been fragmented and reduced relatively recently (in evolutionary terms) by climatic change, human influence or a combination of the two.

32. Two distinct factors need to be considered in assessing the uniqueness of forests: the contribution that they make to global biological diversity and the contribution that they make to national biological diversity. There is no obvious relationship between the extent of forest cover and the importance of the forests for biological diversity.

33. In broad terms, the importance of an area for biological diversity in the sense of species diversity is a reflection of both species richness and endemism. The former is simply the number of species occurring there, the latter is the number of species restricted to the area. In addition, for conservation planning, the number of threatened species in an area is also important.

34. The World Conservation Monitoring Centre (WCMC) has examined species richness and endemism in each country larger than 1000 km^2. In general, LFCs have lower than average biodiversity, which is to be expected in view of the widely recognized overall correlation between forests and terrestrial biodiversity. More particularly, only one out of what are probably the 20 most important countries in the world for biological diversity (Australia) is represented among the 49 LFCs.

35. However, this reveals relatively little about the importance of the forests themselves; for example, much of Australia's biological diversity lies outside forest ecosystems. It is possible that forest areas within a given LFC may be of global importance for biological diversity; unfortunately, data is often lacking on rates of species richness and endemism in different habitats within countries. In general, their importance - if any - is expected to lie in their endemism more than in their species richness, because LFCs have small absolute areas of forest and species richness is strongly correlated with area of habitat, so that it would be expected to be lower than average in LFCs. However, the fragmented and often isolated nature of forest cover in LFCs, where it is long-standing in evolutionary terms, such as on islands or in climatically isolated areas, may lead to greater than average levels of endemism. Climate and isolation are key factors in determining biodiversity in LFCs, and their increasing importance for endemism and species richness through isolation by deforestation is illustrated in box 4.

Box 4. Factors affecting biodiversity complements in LFCs

Climate

Terrestrial biodiversity is generally higher in tropical than in temperate or polar regions; it is also higher in wetter than in drier areas. Countries in the humid tropics are therefore generally the most diverse, particularly their forest ecosystems. Humid regions - both tropical and non-tropical - are also generally the most heavily forested.

Of the 49 LFCs, 12 are wholly or partially within the humid tropics and generally hold the forest with the highest diversity among LFCs; 9 of then are islands and the three remaining continental countries are Kenya, Australia and El Salvador.

Islands

Other things being equal, islands have lower species richness but higher species diversity than comparable continental areas. Thus, since more LFCs than would be statistically expected are islands, endemism in LFC forests is higher than average.

Relict forests

Several biologically important areas of forests have been reduced by deforestation to small remnants of formerly extensive forests. The coastal forests of Kenya and Tanzania once extended in an unbroken line from the Somali border in the north almost as far as Mozambique in the south. They were the home of a unique collection of animals and are recognized as an endemic bird area, with eight species of endemic birds. Human pressure and conversion to agricultural land have now reduced them to a small number of remnant forest patches, such as the Sokoke Forest of Kenya. Although some species are now extinct, a few - such as the Sokoke Scops Owl and Clarke's Weaver - maintain a precarious existence concentrated into these last forest patches. A similar pattern can be observed in the coastal forests of Brazil.

C. Protected areas

36. The internationally accepted definition of a protected area is given as an area of land and/or sea that is especially dedicated to the protection and maintenance of biological diversity, as well as of natural and associated cultural resources, and that is managed through legal or other effective means.

37. In practice, the purpose for which sites are managed differ greatly, and may range from scientific research and tourism and recreation to the sustainable use of resources from natural ecosystems. IUCN has developed a system of broad categories that classify protected areas in terms of their overriding management objectives (IUCN, 1994). The analyses presented in the present report include

only protected areas classified as IUCN management categories I through V; multiple-use areas, such as some forest reserves, have been excluded. There is evidence, however, that this approach can lead to a significant underestimation of the total protected areas estate (WCMC, 1992). Some relevant facts are:

(a) In general, the level of protection in the world's LFCs is low, with a mean of 3.6 per cent compared to a global mean of more than 6 per cent protected area;

(b) Some 36 of the 49 LFCs have a protected areas network that is smaller than the global mean, and only 11 countries or areas are above average in this respect;

(c) Data for a number of countries or areas with larger than average protected area networks, such as Australia, American Samoa, the Cayman Islands, Kiribati and Bermuda, may include large marine protected areas, such as the 34,000 km^2 Great Barrier Reef Marine Park, a consideration that could inflate the calculations of protection based on land area;

(d) Of the 10 countries or areas with less than 0.15 per cent of their land area protected, six are in North Africa and the Middle East. In general, countries in this region have yet to develop comprehensive protected areas networks, the exception being Israel at 16 per cent cover. IUCN is currently developing with government agencies a regional action plan to encourage the establishment of more protected areas in this region (Dean, 1995).

38. Such simple statistics as those mentioned above do not explain the relationship between the distribution of protected areas and forests or other habitat types. Guidelines developed by IUCN (IUCN, 1993) suggest that Governments should aim to protect at least 10 per cent of each biome within their national territory. In the case of countries that have converted substantial areas of forest, 10 per cent of the biome may constitute both a large total area and a high proportion of the remaining forest extent. In contrast, those parts of the world that have never supported significant forest area will be able to achieve the 10 per cent target relatively easily. For example, forests cover less than 0.1 per cent of Saudi Arabia, the entire extent of which could be easily accommodated in even the relatively modest 2.6 per cent of protected area.

39. A number of studies have been carried out to assess the proportion of forest under protection. One overview of protected major ecofloristic zones (EFZ) in the tropics (Murray and others, 1995) indicates that 8.8 per cent of moist tropical forests are protected compared to 7.7 per cent of all original vegetation types. The more extensive protection of moist tropical forests suggests that the strategy to protect high biodiversity habitats is proving to be successful.

40. With respect to conservation of major EFZs, moist zones are better represented in protected areas than dry zones. While the priority given to moist zones may be justifiable in terms of biodiversity conservation, Murray and others (1995) demonstrate the need to increase protected area coverage in drier zones, which predominate in LFCs.

41. It is generally true that stands of forest in LFCs will be small and fragmented, which has important implications for the design and management of protected areas. The long-term effectiveness of protected areas is determined to a considerable extent by edge effects, especially with respect to conversion, poaching and other threats. Larger sites will have a more favourable perimeter-to-area ratio and will be more robust as effective conservation areas. In the case of smaller protected areas, a greater emphasis should be placed upon the development of buffer zones that will deflect pressures away from protected areas without attracting additional settlement and encroachment.

42. The conservation role that protected areas play in LFCs depends to a large degree on the origin of their low forest cover: if forest has been lost relatively recently due to development pressures, remaining habitat fragments will have an exceptional value as refuges for species that were previously widely distributed. Conversely, arid lands that have not supported extensive forests for long periods of time are unlikely to be any more significant in terms of their biodiversity than other habitats found in the region. In the former case, preference should be given to establishing protected areas in remaining forested areas; in the latter, a more even distribution will be required to ensure the representation of arid-land ecosystems and species.

III. INFORMATION REQUIREMENTS

43. As discussed above, the principal issue under consideration for LFCs is the availability of forest-derived goods and services per person, nationally and in global terms. The information needed to arrive at an understanding of the scarcity of such goods and services is lacking at the global level, and may or may not be available at the national and local levels.

44. This is largely because the information systems normally in use are inadequate in a number of ways, as follows:

(a) Topics: the scope of information is too restricted and thus fails to track forest values in terms of the full range of goods and services provided. For example, the use of NWFPs is not often monitored and the dependence of rural communities on them is poorly documented. The service roles of forests, such as for biodiversity protection and carbon sequestration, are rarely covered;

(b) Frequency: the regularity with which information is updated is inadequate so that decision-making is not based on current status and trends;

(c) Land area: information coverage is too restricted. For example, land cover types other than forest that can be sources of forest goods and services are not often included, and minimum-area thresholds mean that small but important forest resources may be excluded;

(d) Quality: information quality is inadequate in terms of its accuracy and comparability. For example, differences in definitions and thresholds for forest cover prevent comparison between countries and often within them as well;

(e) Use: the process of information gathering is not integrated with the purposes for which the information is being gathered.

45. A number of recent developments from the global to the local levels are improving the quality of the information that is available in several ways. For example, the wider use of participatory methodologies is improving the degree to which information on forest goods and services incorporates the perspectives of local stakeholders. Global programmes for the remote sensing of forest resources and increasing the possibilities for incorporating assessments of land cover other than forests that might provide forest goods and services. National monitoring programmes are increasingly being implemented to improve the accuracy of data and the frequency with which they are recorded. And systems approaches, such as forest resource accounting (IIED and WCMC, 1994), are increasingly matching information gathered to the needs of policy makers and other information users.

46. In many cases, new information is needed for developing policies that are appropriate to the management of scarce forest resources, analysing the markets for forest goods and services, determining institutional responsibilities and roles, and planning forest management. The information needed is very diverse, and cross-sectoral information systems are needed to integrate such information into a common context. Information capacities should be integrated with and driven by the forest management and policy processes, and should not function as separate activities. Forest resource accounting (FRA) can meet these needs: it offers a common basis for comparing values and setting priorities, combining information (generally collected in the course of routine management) on forest condition, use, management status, area, legal status and ownership. FRA can also provide much of the information required for the economic valuation of disparate forest goods and services.

IV. APPROACHES AND POLICY OPTIONS

A. Options

47. The security of supply of forest goods and services is likely to be of importance in different ways at local, national and global levels. Mechanisms to evaluate its importance and to ensure the long-term security of supply will require appropriate policies, institutions and information flows.

48. A suggested process for ensuring that full consideration is given to forest security is illustrated in figure 2, based on Upton and Bass (1995). The process is participatory and iterative, and emphasizes the need for continuous improvement. It recognizes that information is currently incomplete, capacities need to be built up, adaptive approaches need to be tried and priorities will change over time.

49. The process accommodates four options for securing forest goods and services:

(a) Developing and managing forests on the basis of a permanent forest estate;

(b) Obtaining forest goods and services from agricultural and other non-forest lands;

(c) Importing these goods and services from elsewhere;

(d) Promoting substitutes for them.

50. Each option has different implications at the local, national and international levels; given the great diversity of situations among LFCs, such implications will vary from country to country. In practice, most countries will balance these various options rather than emphasize only one.

1. Permanent forest estate

51. This option includes:

(a) Forests and woodlands under all types of ownership;

(b) Protection, production and mixed-use categories.

52. The process of developing a permanent forest estate (PFE) identifies the types of forest that are needed to meet demands for forest goods and services now and in the foreseeable future. It matches them with the spectrum of available forests and plantable land under all kinds of ownership, thus linking forest values to specific forest types. It helps to clarify where investment is needed and who should be responsible. Incentives can then be set to promote the sustainable production of goods and services by appropriate groups.

53. Where the required PFE is bigger than the current forest area, afforestation may be indicated (this is common in LFCs). Conversely, where forest area is (locally) larger than the PFE, planned forest conversion may be permitted (rare in LFCs).

54. Food security depends largely on the protection that forests give to water and soils. Many LFCs have lost much forest cover and are suffering some food security problems as a result. Hence, national programmes for food security will require ensuring a level of forest security. Furthermore, national needs for fibre supplies in times of war and disaster may require at least a strategic minimum of PFE.

55. In some circumstances, local interest may favour the production of non-market benefits (recreation, aesthetic values) and subsistence food, fibre and fuel that may be locally non-substitutable. The challenge is to integrate interests, if this is possible and in agreeing on trade-offs between them if it is not.

56. Considerable afforestation will be needed to meet increasing global fibre demands, especially for pulp and paper. For environmental reasons, such afforestation will often be established on non-forested and degraded lands, which are widely available in many LFCs. Where commercial afforestation to meet such demands is envisaged, private-sector financial consortia may be able to

spread risks across different investments and countries. Governmental and intergovernmental assistance for covering the incremental social and environmental costs of achieving good forest stewardship in such plantations may be warranted, and joint implementation schemes for carbon offset, in which markets are now developing, may increase the attractiveness of afforestation on a large scale.

57. LFCs may find it necessary to make all forest management and conservation more information-intensive throughout PFEs (for discussion of improved information capacities, see section III above). However, in many LFCs a practical limit on PFE development may be set by the availability of skills and support structures. The Panel's programme of work includes consideration of the role of international instruments, such as the conventions on climate change, biodiversity and desertification conventions, in both establishing national action plans and coordinating international support for building the capacity to undertake such actions (programme element V.1).

2. Forest goods and services from non-forest lands

58. This option includes goods and services from farmlands, agroforestry, pastoral lands and urban forests.

59. In many countries, non-forest land is as significant as forests for producing fuelwood and fibre, as well as some tree-related biodiversity. Indeed, tree resources on non-forest land can be highly valuable, having been planted or maintained there for specific values. However, forest and other land-use institutions and policies do not generally reflect this reality, so that trees on farms may be invisible to forest authorities.

60. Some LFCs could decide to base the policy and production of forest goods and services on non-forest land, which may mean that production is spread among lands of very different ownerships, for which many different government authorities have mandates. This would entail changes in mandates and responsibilities, the introduction of partnership mechanisms and coherent incentives for operating in different sectors, and improved forestry capacity in authorities dealing with non-forest land. A forest coordinating and advisory service may be needed.

3. Importing forest goods and services

61. This option includes:

(a) Importing timber, pulp or recycled paper;

(b) Paying other countries for carbon sequestration and biodiversity protection, i.e., substituting for local forests.

62. Two issues are at stake here: the substitutability of specific forests, and the ecological and social impacts of imports on exporting countries. Substitutability is contentious and is discussed below. In choosing not to

maintain or develop its own forests, an importing country shifts the burden of the social and environmental costs of production on other countries; it should therefore be aware of such costs.

4. Substitutes for forest goods and services

63. This option includes producing or importing such goods as mineral energy for fuelwood or concrete, plastics and metal for timber.

64. The substitutability of a specific forest good or service is a major issue. Some environmental and social goods and services may either have no substitutes, or such substitutes would be very expensive locally. Life-cycle analysis may be able to compare the environmental impacts of non-forest goods with forest goods.

65. In addition, the substitution of one good or service may affect the production of others. For example, a decision to import all pulp and paper may reduce markets for local thinnings in timber production; if this results in a complete lack of incentives to maintain forests for all other goods and services, substitution may not be appropriate.

* * *

66. For all four options, an additional need is to reduce waste and increase the efficiency of production and consumption, which is particularly important for LFCs facing scarcities. The issue of patterns of production and consumption may be considered in the proposed Norwegian initiative for a study on the theme "Long-term trends and prospects in supply and demand for wood products, and possible implications for sustainable forest management".

B. Criteria for selecting and balancing options

67. Policy decisions about the security of forest goods and services need to be made at the national level. Most countries will select more than one option, and the key issue is to find the right balance. Information needs for assisting such decisions have been outlined; in many LFCs, however, information capabilities may never be ideal and strategic decisions may have to made in a climate of heightened uncertainty and multiple stakeholder demands. Balance also ultimately needs to be achieved at the global and local levels; for example, not all countries can depend upon imports. Achieving balance can be guided by information on forest assets, their economic values, the degree of substitutability of forest products, and an assessment of risk and uncertainty: hence the importance of collecting and sharing information.

68. Substitutability concerns the environmental, social, cultural and economic unique of forests. The first two considerations are contentious, although there are scientific guidelines for biodiversity such as the IUCN guidelines, as well as for natural and cultural heritages. More research is needed on how far forest security is essential for providing the environmental services that are required for food security. The Panel may wish to discuss further ways in which countries can define uniqueness.

69. Uncertainty is increasing, notably in market conditions and as a result of possible climate change. Climate change may mean that forested watershed will increase in its importance for food security and water supplies. Conversely, existing forests in LFCs may become ecologically inviable, particularly as they are often at the extremes of forest viability already. Obviously, adopting only one option is risky, and a balance of options reduces risk.

70. Mechanisms for consultation and debate among stakeholders will facilitate the process of choosing and balancing options. An appropriate forum, such as a forest/forest industry stakeholders' forum could combine scientific information with stakeholder perspectives at the local, national and global levels. Such a forum would improve information flow and the generation of new ideas, and would help to tackle cross-sectoral issues, providing the potential to develop options on the basis of partnership and setting the stage for subsequent decisions.

71. In making such decisions, the principle of subsidiarity, under which decisions are first made at the level at which the scarcity of the good or service most strongly affects welfare, may be helpful. For example, the scarcity of unique forest biodiversity could be considered at regional and global levels, the scarcity of construction timber at the national level and the scarcity of firewood at the local level.

72. Criteria for stakeholders to select and balance options include:

(a) Economic criteria:

(i) Existing forest values and comparative advantage;

(ii) Cost effectiveness of producing good or service;

(iii) Price/market trends;

(b) Social and environmental criteria:

(i) Substitutability or uniqueness of forest for producing the good or service;

(ii) Environmental impacts;

(iii) Social impacts;

(iv) Equity among stakeholders and generations;

(c) Political, institutional and other contexts:

(i) Strategic/military/food security requirements;

(ii) Historical, cultural and other precedents.

V. CONCLUSIONS AND PRELIMINARY PROPOSALS FOR ACTION

A. Conclusions

73. Many countries, of diverse types, have low forest cover. Such countries produce few forest goods and services and often depend greatly on other countries, most obviously for wood and fibre but also for other goods and services. This has implications for the production of goods and services at the global level: the scarcity of forest goods and services is a global problem, and the improvement of forest security should be a priority concern for sustainable development.

74. On balance, the essential nature and limited degree of substitutability of some forest goods and services - notably for food security, water supplies and biodiversity - and the many uncertainties and lack of information in this area, may lead even countries with very low forest cover to consider it prudent to invest in at least a minimum PFE. This may entail considerable rehabilitation efforts and the protection of unique forests.

B. Preliminary proposals for action

75. The Panel may wish to consider the following areas for priority attention as regards LFCs:

(a) Forest goods and services:

(i) The availability of forest-derived goods and services per person both nationally and in global terms, as well as how that availability affects LFCs;

(ii) The widespread problem of acute fuelwood scarcity, which is of particular concern to developing LFCs;

(iii) The proper valuation of non-wood forest products, and recording and reflection of these in both national statistics and global analyses;

(iv) The need for policies and institutions to reflect the significance and value of non-forest land for producing fuelwood and fibre, and for ensuring tree-related biodiversity;

(b) Protected areas and biodiversity:

(i) In the case of smaller protected areas, placing greater emphasis on the development of buffer zones, that could deflect pressures away from protected areas without attracting additional settlement and encroachment;

(ii) If forest has been lost relatively recently due to development pressures and remaining habitat fragments have an exceptional value as refuges for species that were previously widely distributed, giving

preference to the establishment of protected areas in remaining forested areas;

(iii) In the case of arid lands that have not supported extensive forests for long periods of time, creating evenly distributed protected areas to ensure the representation of arid-land ecosystems and species;

(iv) Increasing data collection and analysis and the dissemination of data on rates of species richness and endemism in different habitats within LFCs in order to assess the global importance for biological diversity of their forests;

(v) The need to discuss more ways for countries to define forest uniqueness;

(vi) The need for LFCs to produce national biodiversity action plans;

(c) Afforestation, reforestation and plantations:

(i) The need for afforestation to meet increasing global fibre demands, especially for pulp and paper and the initiation of such afforestation for environmental reasons on non-forested and degraded lands, which are widely available in many LFCs;

(ii) Governmental and intergovernmental assistance in covering the incremental social and environmental costs of achieving good forest stewardship in plantations;

(iii) Joint implementation schemes for carbon offset, in which markets are now developing that may increase the attractiveness of afforestation on a large scale;

(d) Cooperation and participation:

(i) The need for national forest coordinating and advisory services to introduce partnership mechanisms and coherent incentives for operating in different sectors, and to improve forestry capacity in different authorities and institutions dealing with non-forest land;

(ii) The establishment of mechanisms for consultation and debate among stakeholders so as to facilitate the process of choosing and balancing options and combine scientific information with stakeholder perspectives at the local, national and global levels, in order to improve the flow of information and generation of new ideas and tackle cross-sectoral issues;

(e) Information:

(i) The inadequacy of existing information systems as regards their topic and scope; frequency of data update; land area coverage and type; data quality in terms of accuracy and comparability; and the integration of

the process of information gathering with the purposes for which such information is being gathered;

(ii) The need to encourage recent developments from global to local levels in improving the information available, such as:

a. The wider use of participatory methodologies in order to improve the degree to which information on forest goods and services incorporates the perspectives of local stakeholders;

b. The increased use of global programmes of remote sensing of forest resources so as to incorporate the assessment of land cover other than forests that might provide forest goods and services;

c. The implementation of national monitoring programmes to improve the accuracy of data and the frequency with which they are recorded;

(iii) The need for cross-sectoral information systems that integrate information into a common context and the integration of information capacities that are driven by the forest management and policy processes and do not function as separate activities.

76. The Panel may wish to request its secretariat, in preparing for discussion of programme element I.5 at its third session and for the final consideration at its fourth session, to take into account current and future discussions of other relevant programme elements of its programme of work, as well as government-sponsored initiatives under way in support of the work of the Panel.

References

Bibby, C. J. and others (1992). Putting biodiversity on the map: priority areas for global conservation. Cambridge: ICBP.

Biswas, A. K. (1987). "Environmental concerns in Pakistan, with special reference to water and forests". Environmental Conservation, No. 14, pp. 319-328.

Dean, F. A. (1995). "IUCN protected areas regional action plan for the Middle East and North Africa". Draft paper presented to the Riyadh Conservation Forum, 1-4 October.

FAO (1993). "Forest resources assessment 1990: tropical countries". FAO Forestry Paper, No. 112.

FAO (1995). "Forest resources assessment 1990: global synthesis". FAO Forestry Paper, No. 124.

FGDC (1995). "FGDC vegetation classification standards". Reston, Virginia: Federal Geographic Data Committee. Unpublished.

Fisher, M., and A. S. Gardner (1995). "The status and ecology of a Juniperus excelsa subsp. polycarpos woodland in the northern mountains of Oman". Vegetatio, No. 119, pp. 33-51.

Friis, I. (1992). "Forests and forest trees of northeast tropical Africa: their natural habitats and distribution patterns in Ethiopia, Djibouti and Somalia". Kew Bulletin Additional Series, vol. XV.

IIED (1992). Environmental Synopsis of Pakistan. London: IIED.

IIED & WCMC (1994). "Forest resource accounting: stock-taking for sustainable forest management". IIED Forestry and Land Use Series, No. 1.

IUCN (1993). Parks for Life. Report of the Fourth World Congress on National Parks and Protected Areas. IUCN, Gland, Switzerland.

IUCN (1994). Guidelines for Protected Area Management Categories. Gland, Switzerland and Cambridge: IUCN.

Marshall, N. T. and M. Jenkins (1994). Hard Times for Hardwood: Indigenous Timber and the Timber Trade in Kenya. Cambridge: TRAFFIC International.

Mather, A. S. (1990). Global Forest Resources. London: Belhaven Press.

Murray, M. G., M. J. B. Green, G. C. Bunting and J. R. Paine (1995). "Biodiversity conservation in the tropics: gaps in habitat protection and funding priorities". Cambridge: WCMC. Unpublished report.

UNESCO (1973). International Classification and Mapping of Vegetation. Paris.

Upton, C., and S. Bass (1995). The Forest Certification Handbook. London: Earthscan.

WCMC (1992). "Assessing the conservation status of the world's tropical forest: a contribution to the FAO forest resources assessment 1990". Four volumes, unpublished report.

WWF and IUCN (1994). Centres of Plant Diversity. A Guide and Strategy for their Conservation. Three volumes. Cambridge: IUCN Publications Unit.

Figure 1a
Numbers of countries in classes of forest cover (% land area)

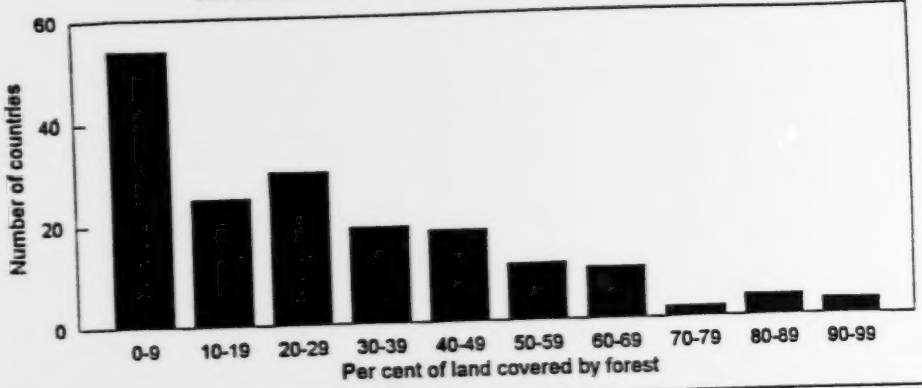


Figure 1b
Numbers of countries in classes of % land covered by forest and other wooded land

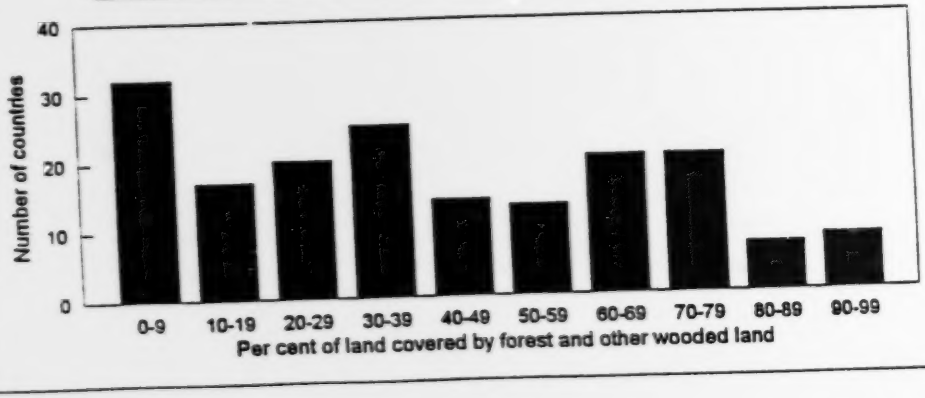
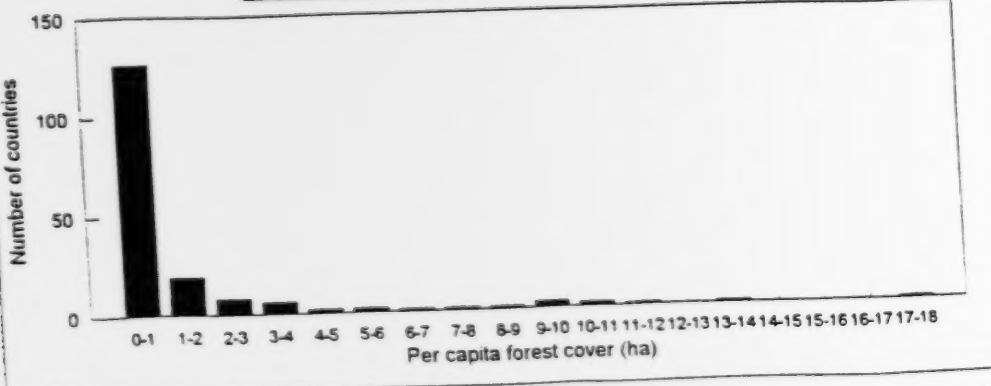
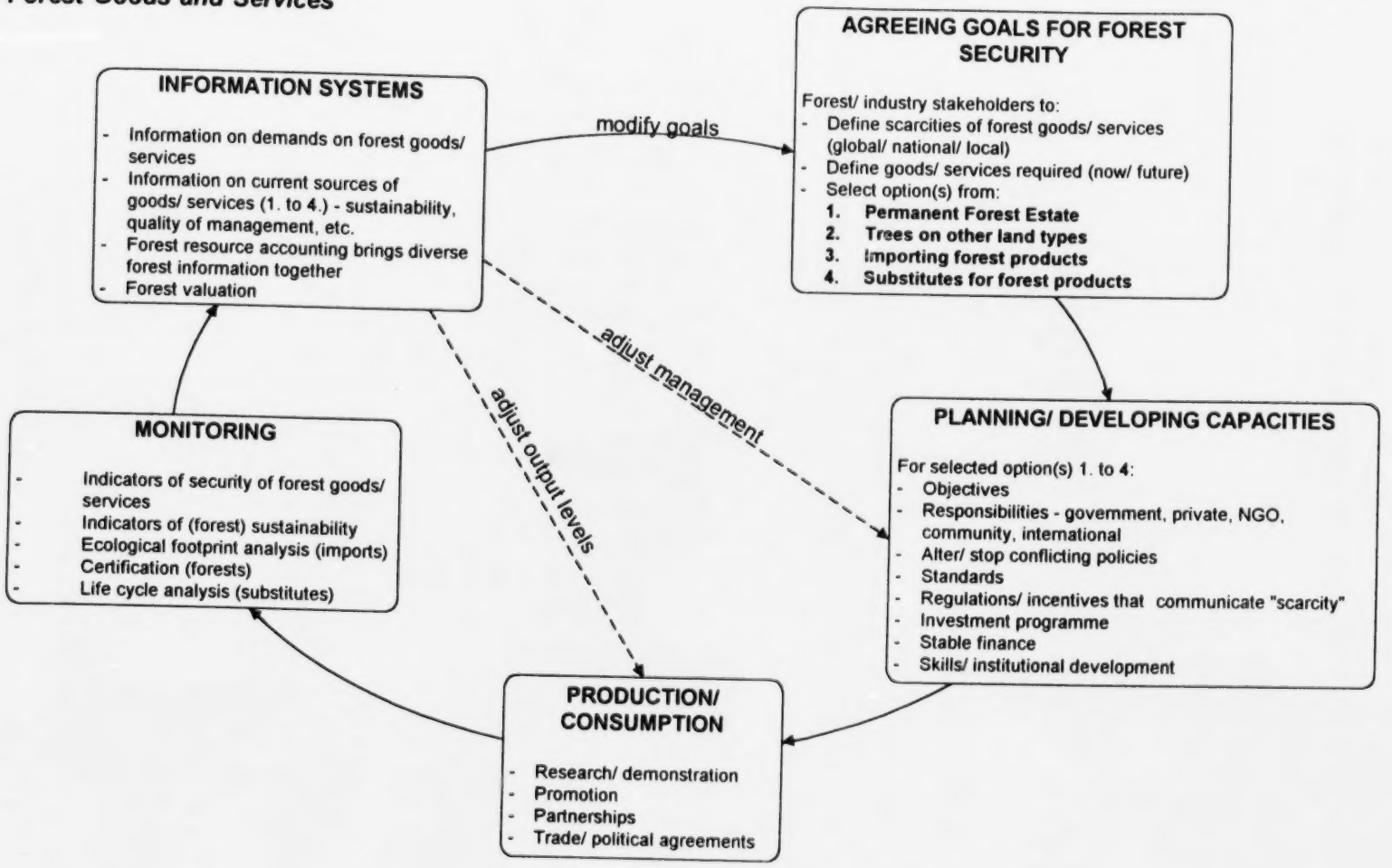


Figure 1c
Numbers of countries in classes of per capita forest cover



/...

Figure 2
Processes for Achieving Security of Forest Goods and Services


INFORMATION SYSTEMS
- Information on demands on forest goods/ services
- Information on current sources of goods/ services (1. to 4.) - sustainability, quality of management, etc.
- Forest resource accounting brings diverse forest information together
- Forest valuation
modify goals
AGREEING GOALS FOR FOREST SECURITY
Forest/ industry stakeholders to:
- Define scarcities of forest goods/ services (global/ national/ local)
- Define goods/ services required (now/ future)
- Select option(s) from:
1. Permanent Forest Estate
2. Trees on other land types
3. Importing forest products
4. Substitutes for forest products
adjust management
adjust output levels
MONITORING
- Indicators of security of forest goods/ services
- Indicators of (forest) sustainability
- Ecological footprint analysis (imports)
- Certification (forests)
- Life cycle analysis (substitutes)
PLANNING/ DEVELOPING CAPACITIES
For selected option(s) 1. to 4:
- Objectives
- Responsibilities - government, private, NGO, community, international
- Alter/ stop conflicting policies
- Standards
- Regulations/ incentives that communicate "scarcity"
- Investment programme
- Stable finance
- Skills/ institutional development
PRODUCTION/ CONSUMPTION
- Research/ demonstration
- Promotion
- Partnerships
- Trade/ political agreements

UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

E/CN.17/IPF/1996/5
20 February 1996

ORIGINAL: ENGLISH

COMMISSION ON SUSTAINABLE DEVELOPMENT
Ad Hoc Intergovernmental Panel on Forests
Second session
11-22 March 1996

INTERNATIONAL COOPERATION IN FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER FOR SUSTAINABLE FOREST MANAGEMENT

Programme element II

Report of the Secretary-General

SUMMARY

The present report covers the implementation of the decisions of the United Nations Conference on Environment and Development (UNCED) related to element II, "International cooperation in financial assistance and technology transfer for sustainable forest management", of the programme of work of the Ad Hoc Intergovernmental Panel on Forests. The report aims to provide updated information and a preliminary analysis of the situation, as well as the outlook for forestry development in the area of financing and technology, with particular reference to international cooperation.

Finance and technology are considered to be interrelated components of investment, which is essential for socio-economic development and growth. Investment in forestry cuts across all aspects of sustainable forest management and development. Net investment is obtained by deducting disinvestment from gross investment. Based on estimates made, annual gross investment for forestry and forest industry in developing countries amounts to $13.5 billion; if this estimated investment is increased by 50 per cent to take into account missing components, such as non-wood forest products and services, infrastructure and institutions, the overall figure would be about $20 billion. At $25 per cubic metre of wood, tropical deforestation amounts to an annual disinvestment of $45 billion. As a result of deforestation, therefore, forestry in the developing countries, especially in the tropics, has been subject to a negative net investment of about $25 billion a year.

96-03184 (E) 290296 040396

/...

There have been several estimates of the net investment required to achieve sustainable forest management in developing countries. In chapter 11 of Agenda 21, it was estimated at about $31.25 billion annually for the period 1993-2000. Several estimates made independently prior to UNCED by several agencies, such as the Food and Agriculture Organization of the United Nations (FAO), the World Resources Institute and the World Wide Fund for Nature, range from $4.5 billion to $18.0 billion a year. Recent studies by the International Tropical Timber Organization estimate a cost about $2.2 billion annually for the additional resources required to implement several priority actions in producer member countries for their sustainable forest management. These large differences on estimates for sustainable forest management reflect the need to clarify significant gaps between requirements and actual net investment.

Of the estimated $31.25 billion a year for the additional resources required for sustainable forest management, about $25.58 billion a year must be raised domestically, a daunting task for developing countries. Since countries have different sizes of forest resources and levels of forest industry, their capacity and capability to raise additional revenues domestically through selling forest products, the collection of royalties, and other forms of fees and taxes will also vary. In many countries, such problems are further compounded by a low budget allocation for forestry due to its low priority in national macro-policies, which is largely the result of distortion in national accounts and insufficient awareness about intangible forestry contributions. This is well reflected in the statistics contained in the present report: some countries can finance a large part of their forestry investment domestically, while others must rely heavily on the external sources.

There are cases of successful private-sector participation in large-scale reforestation/reafforestation programmes in developing countries. Such participation, however, is still relatively limited; private-sector participation is largely concentrated in the forest-based processing sector. Due to the long gestation period and risks associated with investment in forest resources, the private sector will only invest if attractive incentives are provided.

Investment from foreign sources falls under foreign assistance and foreign investment. Detailed information on the forestry component of total foreign investment in 1993 ($226 billion) is not available. Most foreign investment in forestry in developing countries is channelled through transnational corporations, which have substantially increased their involvement in forest-based industries. Although in previous decades such involvement was based on "straight" investment, this is now being replaced in favour of joint ventures due to the gradual growth of host country investors' abilities to mobilize capital.

Official development assistance (ODA) is an important source of foreign finance and technology transfer for many countries and an important potential catalyst in facilitating coordinated development. ODA is provided to developing countries bilaterally by donor countries and multilaterally through

international agencies. Some 20 donor countries and 13 multilateral agencies are actively involved in providing ODA for forestry. Multilateral assistance agencies include multilateral development banks, international agencies, non-official assistance agencies and non-governmental organizations. Multilateral mechanisms, such as the Global Environment Facility and Capacity 21, provide resources for targeted activities, including environmental conservation and country capacity development. In spite of its vital role, the availability of ODA in the year 1993 (the maximum achieved) amounted to only 27.2 per cent of the needs of the forestry sector as specified in chapter 11 of Agenda 21 (US$ 1.54 billion, against an annual estimated need of US$ 5.67 billion).

The post-UNCED trend in ODA for the forestry sector has not shown any significant increase: total ODA was US$ 1.43 billion in 1990 and US$ 1.54 billion in 1993 at current cost (without adjusting for inflation), and available indications are that even this small increase has not been maintained beyond 1993, and ODA has in fact been falling. The total amount of the FAO field and regular programme together fell from US$ 78.5 million in 1993 to US$ 70.0 million in 1994; World Bank loan approvals fell from US$ 278 million in 1994 to US$ 113 million in 1995; and similar trends have been noted in the case of a number of bilateral donors. In any case, chances of increased ODA for the forestry sector in the near future is expected to be minimal. An analysis of ODA, by donors, geographic distribution and field of action, is contained in the present report.

Experience with ODA has indicated several shortcomings whose removal could considerably improve its effectiveness, including a multiplicity of donors with different priorities and a lack of adequate coordination of ODA activities. The differing priorities of donors and recipients have also led to conflicts. The proliferation of frameworks for fund utilization has affected the capacity of countries to demand and receive ODA. There is also insufficient country commitment and low absorptive capacity. The problems created by the low absorptive capacity of many countries must be dealt with through expanded technical assistance targeted at building up human capital and appropriate institutions: this is an important responsibility of ODA.

Improved technological and planning capabilities are vital for sustainable forestry. Technology acquisition for forestry can take place through technology development locally or transfer of technology from outside. Generation of technology locally through national institutions is severely hampered by the lack of financial and human resources. In fact, most established research institutions are foreign-based, and have different views and perspectives about problems in developing countries. Since only 5 per cent of ODA is channelled to forestry research, compared to about 10 per cent for agriculture, it is no surprise that there has been a lack of new breakthroughs in forestry technology in the recent past.

One of the solutions to the technology gap in many developing countries is the transfer of technology. At the international level, there are a multitude of institutions with specific capabilities and comparative advantages for providing technology to countries in need. The major sources

of technology transfer to developing countries are foreign investors (including equipment suppliers), bilateral and multilateral assistance agencies, institutions of the Consultative Group on International Agricultural Research, non-governmental organizations and foundations, and technical cooperation among developing countries. Innovative arrangements through agreements with foreign firms have been tried in some countries, such as the INBio-Merck agreement for bio-prospecting in Costa Rica.

The economic potential of raising additional revenues through innovative financing has been discussed extensively. At the national level, that includes establishing various forms of taxes, full cost pricing, and the sale of management bonds. Although some of these innovations look promising, their feasibility is also subject to various factors, including current rates of royalties and taxes on forest products and services, size of forest resources and status of forest-based industries. Such innovations could be implemented in some countries thanks to the size of their forest resources and level of technologies, but many other countries would not be able to benefit.

A similar situation exists for external sources, such as debt-for-nature swaps, carbon off-sets, tradeable emission permits, bio-diversity patents etc. Although such innovations have been available for some time, their economic potential has not been fully realized. Except for debt-for-nature swaps, which have managed to attract about $76 million so far (still a relatively small figure), other innovations have yet to be fully implemented. Incentives and motivations to implement such innovations are greatly influenced by other factors, such as the introduction of a carbon tax, the size of the market for carbon sequestration and biological diversity.

CONTENTS

	Paragraphs	Page
INTRODUCTION	1 - 6	7
I. INVESTMENT IN FORESTRY	7 - 23	8
A. Estimation of current investment in forestry	9 - 17	8
B. Investment needs estimates	18 - 23	10
II. FINANCING FORESTRY DEVELOPMENT	24 - 52	11
A. Domestic sources	25 - 39	12
B. Foreign sources	40 - 45	17
C. Constraints in financing for forestry	46 - 52	18
III. ACQUISITION OF TECHNOLOGY	53 - 63	21
A. Technical cooperation among developing countries	59 - 60	23
B. Research	61 - 63	23
IV. DEVELOPMENT ASSISTANCE	64 - 98	24
A. Bilateral assistance	67 - 70	24
B. Multilateral assistance	71 - 82	25
C. Trends since the United Nations Conference on Environment and Development	83 - 89	27
D. Shortcomings of the official development assistance system	90 - 91	29
E. Improved mechanisms	92 - 98	30
V. INNOVATIONS IN FUND MOBILIZATION	99 - 112	31
A. External resource flows	100 - 105	31
B. Domestic resource flows	106 - 109	32
C. Institutions to support targeted financing for forestry	110 - 112	34
VI. CONCLUSIONS AND OPTIONS FOR FURTHER CONSIDERATION BY THE PANEL	113 - 116	35

CONTENTS (continued)

Page

Tables

1. Variations in funding levels of selected developing countries for forestry, 1991-1994 13

2. Official development assistance for forestry, 1986-1993 28

3. Share in official development assistance, by region, 1993 28

4. Change in volume of official development assistance devoted to forestry, 1986-1993 37

INTRODUCTION

1. The present report covers element II, "International cooperation in financial assistance and technology transfer for sustainable forest management", of the programme of work of the Ad Hoc Intergovernmental Panel on Forests. The report aims to provide updated information and a preliminary analysis of the situation, as well as the outlook for forestry development in the area of financing and technology, with particular reference to international cooperation. Official development assistance (ODA) receives the most detailed treatment. The report focuses on the developing countries, since the subject is particularly relevant to them and the necessary information is available; subsequent reports will provide more information on countries with economies in transition.

2. The work under programme element II is guided by the decisions taken by the Commission on Sustainable Development at its third session and further elaborated by the Panel at its first session.

3. The Commission defined programme element II as a need to explore ways of improving the efficiency and coordination of bilateral and multilateral assistance, and consider ways to address the critical areas relating to the transfer and development of environmentally sound technology on favourable terms, as mutually agreed, and the mobilization of financial resources, including the provision of new and additional resources with a view to assisting developing countries in pursuing policies and comprehensive strategies for achieving sustainable forest management, taking into account Principles 10 and 11 of the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests 1/ (Forest Principles) and the Rome Statement on Forestry agreed by Ministers responsible for forests in March 1995.

4. At its first session, the Panel re-emphasized the need to explore and consider ways to address the areas relating to the transfer and development of environmentally sound technology on favourable terms, as mutually agreed, and the mobilization of financial resources to assist developing countries in pursuing policies and comprehensive strategies for achieving sustainable forest management, taking into account ongoing work of the Commission and other relevant processes. Consideration should also be given to ways of improving the efficiency and coordination of bilateral and multilateral assistance in delivering forestry programmes, including proposals for cooperation at the national and international levels (a) within and among all relevant multilateral institutions, including United Nations agencies and the World Bank, and (b) between bilateral and multilateral donors.

5. The report was prepared by the United Nations Development Programme (UNDP), as the lead agency for programme element II, in consultation with the secretariat of the Panel in the Division for Sustainable Development, Department for Policy Coordination and Sustainable Development of the United Nations Secretariat.

6. Subsequent reports will benefit from the outcome of an inter-sessional workshop on finance, scheduled for 4-7 June 1996 in South Africa. To be co-sponsored by UNDP and the Governments of Denmark and South Africa, the workshop will give greater attention to mobilizing financial resources, especially innovative financing to finance programmes for sustainable forest management in the developing countries and countries with economies in transition.

I. INVESTMENT IN FORESTRY

7. Finance and technology are considered interrelated components of investment, which is essential for socio-economic development and growth. Investment in forestry cuts across all aspects of sustainable forest management and development. Expenditure on current production is not considered as investment, which may be classified as gross or net investment. Net investment is obtained by deducting disinvestment from gross investment.

8. In the forestry sector, investment covers the cost of the creation, management and conservation of forest resources, and of developing facilities for the production and marketing of forest products and services for many and diverse social, economic and environmental benefits. World wide, the needs and opportunities for investment for forestry are vast.

A. Estimation of current investment in forestry

9. Important activities to be considered in estimating investment in forestry are:

(a) Resource development (reforestation, agroforestry, forest management);

(b) Resource conservation (forest, soil, water, biodiversity);

(c) Facilities for production of goods (wood and non-wood products) and services;

(d) Infrastructure (e.g., improved access, facilities);

(e) Interface activities (forestry interface with agriculture, animal production, fishery, primary health and medicine, tourism, construction and trade;

(f) Research, technology, extension;

(g) Human resources development.

Information on most of these activities does not exist in most developing countries, which seriously hampers the calculation of current levels of investment. Available information is confined to the area of forest land by broad categories, such as natural forests and plantations, and production and

trade in wood and wood products. Estimates based on such information can only suggest the broad outlines of the above-mentioned activities.

1. Gross investment

10. The total area of natural forests in developing countries is estimated at 1.9 billion hectares (ha). Recorded area of forest plantations in 1990 was 68.4 million ha, with an average annual addition of 3.2 million ha. To estimate the annual investment in forestry, it is considered (based on reported figures) that average investment for raising one hectare of forest plantation is $650, and the average annual cost of maintenance and protection per hectare of natural forest is $2. On that basis, the annual investment in forest resource management in developing countries works out to about $6.1 billion.

11. Similarly, it is assumed that average annual change of production of roundwood, sawnwood, wood-based panels and paper (in developing countries) has entailed investment for plants, machinery and infrastructure. Assuming an average investment per unit of additional production capacity of these products as reported in recent studies, the estimated annual investment for harvesting and processing is $7.5 billion.

12. The total estimated annual gross investment for forestry and forest industry in developing countries thus amounts to $13.5 billion. Investment statistics on agroforestry, non-wood forest products and services, infrastructure, institutions and human resources development are completely unavailable. If the estimated investment is increased by another 50 per cent, to account for the missing components, the overall investment would be about $20 billion.

2. Disinvestment

13. Disinvestment, on the other hand, is negative investment resulting from the destruction or depletion of capital stock through capital consumption. Whether planned or unplanned, deforestation that leads to destruction of forest stock is a case of disinvestment. Other forms of disinvestment include depreciation of stocks, equipment, infrastructure etc. Forest disinvestment has happened in the past and continues to happen today, as is evident from the increasing rate of deforestation.

14. According to The Forest Resources Assessment 1990, the annual change of natural forest cover in the developing countries during 1981-1990 was -16.3 million ha, compared to -11.3 million ha during 1971-1980. The estimated average wood volume per hectare is 113 cubic metres (m^3); estimated average biomass per hectare is 169 tons. At $25 per cubic metre of wood (without any value being put on biomass), the annual disinvestment in the forests of developing countries for the estimated rate of deforestation comes to $45 billion.

15. The above amount does not fully represent the real extent of disinvestment: it does not take into account the loss of biodiversity; the degradation of

agricultural lands, watersheds and pastures; the displacement of forest peoples; the depletion of resources of non-wood forest products and services, medicinal plants, and fishery products (particularly in mangroves); and the overall negative impact of deforestation on environmental stability and community welfare. Nor does it take into account the degradation in forest quality caused due to fire, grazing, shifting agriculture, fuelwood collection, overfelling of trees and other forms of injurious interference. Information on change in forest quality is minimal, but indications are that it may represent an even greater disinvestment than deforestation.

16. It is clear that annual gross investment in forests over the past several years has been much lower than the actual disinvestment, resulting in a negative net investment of $25 billion. Correcting the cumulative effects of net disinvestment over the years will require significant efforts.

17. It is interesting to compare the situation of forestry with that of agriculture. The estimate of net investment in on-farm improvement for primary agriculture in developing countries is $26 billion per year between 1987 and 1992, gross investment being $77 billion; the corresponding figures for the post-harvest sector and agro-industries are $16 billion and $40 billion, respectively. In addition to this largely private investment in developing countries, it is also estimated that a net $10 billion per year is involved in publicly funded research and extension, with another net $15 billion per year of public expenditure going to rural infrastructure. These add to a total net investment of $67 billion per year for agriculture in developing countries. The annual gross investment for agriculture in developing countries during the period 1987-1992 was $144 billion, and is expected to rise to $175 billion per year during the period 1993-2013.

B. Investment needs estimates

18. There are several pre-UNCED estimates of investment needs, which were made for different purposes, with different scope and assumptions. In 1985, the World Resources Institute (WRI) report, "Tropical forests: a call for action", presented an estimate of $5.3 billion over the five-year period 1987-1991, or about $1.1 billion per year, for 56 tropical countries. The 1985 estimate of the Food and Agriculture Organization of the United Nations (FAO) for required investment in 53 countries (28 in Africa, 11 in Asia and 14 in Latin America) was $4.6 billion.

19. In 1987, FAO made a further estimate of the annual need for investment for forestry development in developing countries at $13 to $17 billion. Of that amount, 70 to 80 per cent was for forest industry and industrial forestry development. An estimate by the World Wide Fund for Nature (WWF) in 1991 for forestry development, including the development of forest-based industries, gave an annual figure of $18 billion.

20. The annual estimate of financial requirement for sustainable forest management provided in chapter 11 of Agenda 21 2/ for four forestry programme areas was $31.2 billion for the period 1993-2000, not including the cost of

implementing forestry components under other chapters of Agenda 21 and related conventions or the full cost of putting the Forest Principles into effect.

21. In 1995, the International Tropical Timber Organization (ITTO) estimated costs to producer countries of attaining the target of sustainable management of tropical forests by the year 2000 at $2.2 billion per year for priority actions. However, that estimate covered only a limited number of activities: the enforcement of policy, law and regulations; demarcation and maintenance of boundary, improved logging, training, research and public education.

22. All such estimates should be interpreted to represent the magnitude of the net investment required. Based on all new information available, it is possible to make a revised estimate that would include the following assumptions:

(a) Governments will be able to control deforestation, reducing it by half by the year 2000, to reach a minimal level of deforestation by 2010;

(b) Depreciation of forest capital resulting from deforestation and degradation will be made up through investment in resource creation, rehabilitation and improved management;

(c) Incremental demands for forest products will be met by intensive forestry in high-yielding forest plantations/production forests;

(d) Investment in forest industries (new mills, mill replacements and industrial infrastructure) will be made to meet existing and incremental demands;

(e) Adequate investment will be made available for developing support services, market infrastructure, institutional capability, information generation etc.

23. The estimate based on all the new information remains similar to that of Agenda 21, except that $36 billion are added to counter the depreciation resulting from deforestation. The estimates are presented not to generate discussion or debate on these indicative figures but to clarify that, however large they may be, there is a significant gap between requirements and actual net investment.

II. FINANCING FORESTRY DEVELOPMENT

24. Investment can be broadly categorized as domestic and foreign, and it is possible to distinguish public and private sources of finance, as follows:

Type of investment	Domestic	Foreign
Public	Public administration/institutions State-owned enterprises	Development assistance Loans, grants
Private	Individuals, cooperatives Companies, non-governmental organizations	Direct investment Portfolio investment

A. Domestic sources

25. In the long run available resources are defined by a country's resource mobilization capacity, which is determined by its national income and the propensity of both its private and public sectors to save. The balance between domestic and foreign finance for investment is a key and controversial question. Some examples are provided in table 1; it seems to be generally accepted that most financing of investment will come from domestic sources.

26. Mobilizing funds for forestry of the size indicated from domestic sources is a daunting task for developing countries, the success of which depends on the facilitating efforts and policy supports of the Government. Policies and regulations relating to land tenure and forest resource management and utilization are critical. Various arrangements are encountered in this regard, such as:

(a) Forests owned and managed (including harvesting) by the Government, and product processing/marketing fully or partly carried out by the Government;

(b) Forests owned and silviculturally managed by the Government, and harvesting, processing and marketing undertaken by the private sector;

(c) Forests owned by the Government and managed (except for protected areas) by the private sector on lease arrangements, including harvesting, processing and marketing;

(d) Forests owned and managed (including community and customary ownerships) by the private sector, subject to policy regulations of the Government;

(e) Forests privately or customarily owned;

(f) Combinations of two or more of the above.

27. Even in situations in which ownership and management responsibilities reside with the private sector, there is a need for public-sector investment in policy enforcement, infrastructure development, and training and education. Responsibility for socially and environmentally oriented programmes with a low financial rate of return falls on the Government.

Table 1. Variations in funding levels of selected developing countries for forestry, 1991-1994

Country	Per capita GNP of 1990 (US$)	Forest area as per cent of land area	Forest area per capita (ha)	Investment		Investment per hectare of forest (US$)	ODA investment per hectare of forest (US$)	ODA investment per capita (US$)
				Total (thousands of US$)	ODA (thousands of US$)			
Bangladesh a/	210	8	0.01	10 930	8 730	10.90	8.70	0.08
Fiji b/	1 780	47	1.17	9 288	2 235	10.89	2.62	3.08
Gambia d/	340	10	0.11	1 200	888	12.24	9.06	1.04
India b/	360	22	0.08	238 440	68 350	3.67	1.05	0.08
Indonesia c/	560	64	0.64	5 273 465	36 767	45.59	0.32	0.20
Mozambique c/	80	22	1.11	1 200	1 100	0.07	0.06	0.07
Philippines b/	730	27	0.13	34 810	28 698	4.33	3.57	0.46
Senegal c/	710	40	1.04	10 100	8 460	1.32	1.11	1.15
Uganda d/	180	32	0.32	7 000	4 530	1.10	0.71	0.25

a/ 1991 figures.

b/ 1992 figures.

c/ 1993 figures.

d/ 1994 figures.

28. Often, forests are a source of revenue for Governments, and the situation may be reversed when forests are depleted. Forest revenue sources for Governments are of several types:

(a) Sale of forest products: proper pricing based on market value is important. Lower prices lead to revenue loss and cause market distortions, removing the incentives for the private sector to engage in afforestation and forest-management activities.

(b) Collection of royalties, fees, levies, and other charges: this system is common where government forests are leased to private entrepreneurs. The purpose of these charges is to capture the maximum possible rent without affecting the incentive for sustainable management.

(c) Administrative and service charges towards the cost of services rendered by the Government relating to policy enforcement: where forests are owned and managed privately, the cost of government-provided services are recovered in the form of taxes.

29. For various reasons, many countries are unable to raise public funds; programmes that depend on public finances, such as conservation, infrastructure and institutional support, thus tend to be severely underfunded. Public-sector financing alone cannot support sustainable forestry development. The private sector is needed to mobilize the funding required. In Brazil, domestic private enterprises provide 85 per cent of investment in wood-product industries; in Chile, the private-sector share in processing is 95 per cent.

30. Because of the comparatively long-term and high-risk nature of investment, forest-resource development and management in most developing countries does not attract sufficient levels of private investment. On the other hand, the harvesting, processing and marketing of forest products tends to be mostly private, given its higher and quicker payback. Private investment in tree planting or forest resources development is encouraged through incentives, such as tax remissions and subsidies. Management of private natural forests, however, is much less common compared with private forest plantations, due to greater uncertainty and perhaps a lower return on investment. Private-sector investment in eco-tourism may be increasing.

31. For private-sector investment in forestry, sources of funds are varied, and include personal savings, loans, subsidies, cooperative and corporate shares. Investment is influenced by policies and strategies adopted for mobilizing capital, including incentives, credit and marketing facilities and regulations related to products, scales and horizons. Private domestic investments in the forest-based sector include small local enterprises and medium and large national enterprises, including large private corporations. Non-governmental organizations, private voluntary organizations and community-based organizations, though not strictly private institutions, often mobilize funds for investment in activities that support forestry-related environment and local community development, without profit motives.

1. Small investments

32. Small investments in forestry are often local investments, sponsored by or for local people and using local resources. Small entrepreneurs, mainly small farmers, contribute considerably to the mobilization of investment. The main sources of their funds are personal savings, grants, loans and subsidies. Rural-level cooperatives facilitate the pooling of resources and help to build bargaining strength. Several factors affect the extent and efficiency of local private investment, such as access to land, regulations related to tree/forest crops, organized credit facilities, price guarantees for products, institutional support, extension services and adequate incentives. Local investment in forestry takes place in tree growing, economic forest-product harvesting and small-scale processing enterprises.

33. In many developing countries, local investments add up to sizeable amounts through the involvement of large numbers of individuals, families and local organizations. For example, a 1985 survey indicated that the local participatory effort involved in planting 1,200 million seedlings in India in 1984 was equivalent to an investment of $222 million. Small-scale private investment involved in such activities as growing medicinal and oil-yielding plants, rattan cultivation, beekeeping, lac cultivation, mushroom production, wildlife farming and agroforestry is quite large; data on its exact extent is unavailable.

34. In many countries, small-scale operations predominate numerically in forest-based processing; they are entirely privately owned, are labour-intensive, involve little capital input, and use mostly low-cost technology, producing sawnwood, packing cases, matches, tool handles, furniture, bamboo and rattan products, charcoal etc.

35. However, experience in many countries indicates that local producers of forest products are especially vulnerable: many small-scale tree-planting and forest-based processing enterprises fail. The right combination of resource-pricing policies, incentives, credit, technology, research and support to stimulate successful local community investment is a major issue in forestry today. Recent experience shows that if the resources of local populations are mobilized effectively, a great deal of productive and effective forestry investment can take place at a relatively low public cost (see box 1). More information and analysis in this area are needed.

Box 1. Government funding support to small investors in forestry

Specialized government agencies appear to be the most important source of institutional loans for small local entrepreneurs in many countries. Agricultural Finance Corporation of Kenya provides loans for growing fuelwood to individual farmers and farmers' cooperatives at 12 per cent interest. In Colombia, Fondo Forestal provides low-interest guaranteed loans through private commercial banks. In Jamaica, loans are available for farm forestry from the Agricultural Credit Bank. In Brazil, the National Petroleum Council finances the Small and Medium Property Reforestation Programme. In India, the Farm Forestry Programme of the National Bank for Agriculture and Rural Development facilitates loans for farm forestry to individual farmers and farmer organizations.

2. Medium-to-large investments

36. Private investments in medium-to-large enterprises are initiated by industrial firms and private corporations/companies. Funds for large investments are drawn from reinvestable savings, equity shares, stocks, bonds, loans from national and international financing agencies, equipment manufacturers and so on. Medium and large-scale investors are present in many forestry activities: forest plantations, forest harvesting, forest-based processing activities and marketing. Some of the large units are integrated complexes that operate from forest to market-place, such as Jari in the Brazilian Amazon. However, in most countries private investment in forestry generally flows into the processing subsector, using raw material resources created through local investments or available from government forest lands. Larger-scale forest-based industries are characterized by larger capital investment in absolute terms; a higher proportion of capital budget relative to working capital; and a higher relative capital investment per unit of labour and raw material.

37. Private-sector investment in large-scale plantations has been forthcoming, especially if various types of incentives are provided by Governments and specific and financially attractive market opportunities exist. Successful large-scale industrial afforestation/reforestation programmes under private sector have been taken up in many developing countries, such as Argentina, Brazil, Chile, Indonesia, Malaysia, the Philippines, the Republic of Korea, Swaziland, Uruguay, Venezuela and Zimbabwe.

38. Governments also support medium and large private firms investing in forestry industry through investment promotion packages, such as loan guarantee programmes, tax holidays, duty-free importation of equipment/machinery, provision of infrastructure etc. Incentives often include a commitment to supply raw materials from government forests and long-term forest management/harvesting leases.

3. Non-governmental organizations

39. Non-governmental organizations raise funds at the local, national and international levels through multiple sources, such as donations, subscriptions and governmental project support. The influence and presence of non-governmental organizations in forestry is strong in several countries. In Bangladesh for example, there are a number of non-governmental organizations involved in forestry, with development delivery capability and experience in organizing people and working with the rural poor; some of them also have facilities for providing credit, training and marketing services. Collateral-free short-term loans are available through the Grameen Bank to individuals and groups engaged in rural small-scale forestry. Achievements in organizing groups and implementing tree planting as an income-earning activity are impressive, with some 25,000 small groups involved in social forestry. The sericulture programme of the Bangladesh Rural Advancement Committee is specially designed to benefit landless women. Mulberry raising is carried out in homesteads, roadside plantations and agroforestry plots. The programme integrates mulberry growing with silkworm rearing, cocoon production, silk reeling and spinning, thus promoting development rather than subsistence.

B. Foreign sources

40. Least developed countries have not yet reached a level of national income sufficient to yield the domestic savings required to finance investments necessary for further growth. This makes foreign financing necessary, which falls under two categories: foreign assistance and foreign investment.

1. Foreign assistance

41. Foreign financing for forestry in the form of ODA essentially provides resources to support non-commercial activities and technical assistance, and plays a vital role in funding social and environmental costs. Official development finance transferred about $53 billion (net) to developing countries in 1993 (for international development non-governmental organizations and non-official groups providing technical and financial assistance, see section 5).

2. Foreign investment

42. Foreign investment comprises both direct investment and portfolio investment. Foreign direct investment in developing countries by all countries in 1994 amounted to $226 billion, an increase of 9 per cent over the 1993 figure and far exceeding ODA. However, foreign direct investment in 1992 in the whole of Africa (excluding South Africa) was only $1.7 billion, compared with 9.0 billion in China and $1.8 billion in Indonesia. Information on the share of foreign direct investment in forestry is not available. Foreign private investment takes place mostly through transnational corporations (TNCs), and may complement ODA.

43. The presence of TNCs in the forest-based sector has grown both in the number of developing countries covered and the number of TNCs involved. TNCs from some 30 countries operate in the forest-based sector of developing countries of Africa, Asia, and Latin America. In Africa, foreign-owned and controlled operations account for over 60 per cent of total investment in the sector. Until about 1970, the forest-based activities of TNCs primarily operated through wholly-owned subsidiaries, mostly involved in log production and trade. During the 1970s and early 1980s, TNCs were required in many countries to: (a) increase investment in the local processing of timber, and (b) accept local equity participation in forest-based ventures. "Straight" foreign investment is being replaced in favour of joint ventures.

Box 2. Inadequacies of investment information

Full information on investment and other expenditures in the forestry and forest industry sector is generally not available. Coverage varies from country to country, often depending on the agency providing the information. In most cases, information only covers government allocation to its forestry agency/department. Some countries do provide information on external assistance; most do not divide funding into capital investment and current operating expenditure. Only in rare cases is it possible to obtain information on the private sector, whether foreign or domestic.

44. This is due, in part, to a gradual growth in the ability of host country investors to mobilize capital. The present state of engineering and heavy industries in developing countries means that much of the equipment needed for expanding domestic capacity will have to be imported. Pressure on meagre foreign-exchange reserves can be alleviated by TNCs, which can progressively provide technology to increase local sourcing of inputs, including some equipment.

45. A recent development in international private financing in forestry is the interest of entrepreneurs in the creation and sustainable management of forest resources. An example is Precious Woods Ltd., founded in 1990 by investors for the reforestation of fallow lands, sustainable management of existing natural forests, and sustainable production of tropical timber through reforestation and harvesting. Precious Woods Ltd. is investing about $40 million in Costa Rica for raising plantations of teak and other valuable species and conserving the rain forests of the country; the number of similar schemes is increasing.

C. Constraints in financing for forestry

46. Financing for forestry is complex because of its environmental, economic and social rôles and externalities. Long return periods and externalities (including non-use values) make it different from many other sectors in terms of financing needs. Financing forestry development in the developing countries is constrained by several factors. Some are generic to most sectors of the economy, such as poverty, lack of funds and credit facilities, poor

institutional capability, inappropriate development policies, inadequate infrastructure, inadequate people's participation, lack of private sector involvement, low labour productivity, inadequacies of technology, a lack of information and databases, deficiencies of land tenure systems and a lack of intersectoral coordination. Some constraints also have an international dimension, such as current practices in most ODA financing. Trade restrictions or barriers are another important issue: European consumption of tropical wood products decreased by 26 per cent between 1981 and 1992.

47. Constraints specific to or of high severity for forestry include: low priority, slowness of policy reforms, uncompensated land transfers and accounting distortions. Forestry is perceived by many as a marginal activity. Only the value of wood (timber and fuelwood) is considered in comparing the value of forest land against its possible agricultural output. Forestry is often misinterpreted as wood production; it is important to establish awareness of the many other roles of trees and forests in increasing food security; reducing environmental degradation; providing rural energy and employment; mitigating climatic changes; maintaining the integrity of watersheds; and providing medicines.

48. As a result of the low priority assigned to it, policy reforms in the forestry sector have been slow, often lagging behind the reforms of national macro-policies. In many countries, forest policies lack transparency and a progressive people-centred approach, and forestry is accorded a secondary status, forming part of a large government department or ministry, such as a ministry of food, agriculture, natural resources or primary industry. The low priority assigned to forestry in national development plans results in low budget allocations in comparison to needs, and is reflected in lack of technical capability, human resources, extension facilities, basic data/information, and administrative efficiency. This in turn deters entrepreneurial investment in forestry.

49. Divestment of forest capital and land transfers support development in other sectors, such as mining, tourism, agriculture, and hydropower. Such land transfers are made easier due to the extreme undervaluation of forest lands.

50. In national accounts, there are several distortions relating to forestry. Apart from the land transfers mentioned above, the value of a number of forest benefits, such as medicinal plants and other non-wood forest products and forest grazing, are not reported at all or are included in the accounts of other sectors. Forest foods, grazing and fodder are often reported under agriculture.

51. The total value of forest benefits should be reflected in an integrated manner in the system of national accounts. National accounts should consider wood products, non-wood forest products and forest influences/intangible benefits as components of an integrated whole. Together with valuation of forest resources stock, these would provide a more realistic and meaningful representation of the value of the forests.

52. The total value of the formally recorded production of wood-based forest products in the world in 1993 was $391 billion, of which the share of developing countries was $144 billion. If the value of all forest benefits were included,

the value of forest benefits accrued to developing countries would be nearly three times as much, increasing the currently recorded contribution of forestry to gross domestic product (GDP) from 3 to about 10 per cent or more. The case of India illustrates the situation: its officially accounted contribution of forestry to national income is only $2.9 billion, against the actual contribution of benefits valued at 43.8 billion (see box 3).

Box 3. Real value of forests: the case of India

The magnitude of underestimation and underreporting of forest benefits is great, and India provides one of the best databases for its estimation.

	Billions of United States dollars
Forest grazing: some 270 million cattle graze in forests. Minimal value of $36 per year for providing alternate source per animal	9.7
Green fodder: average annual collection of 400 million tons. Value estimated at $5 per ton	2.0
Medicinal plants: nearly 70 percent of the population use indigenous herbal medicine as a means of primary health, the bulk of it originating in forests. Value estimated at $10 per person	6.3
Non-wood construction materials (thatching materials, bamboo, grass, fibres etc.): assumed that 250 million people living below the poverty line use non-wood construction materials from forests, valued at $10 per year	2.5
Food: 67.8 million tribal people who depend on forests for their livelihood. A food value of $100 per year for food derived from forest is assumed	6.8
Wood products, fuelwood and charcoal estimate	16.5
Total	43.8

This estimation does not consider the values of many minor products, nor does it consider the value of biodiversity conservation, wildlife and nature tourism, watershed protection or the sequestration of carbon.

III. ACQUISITION OF TECHNOLOGY

53. Technology covers the physical, human and organizational capacities, and includes hardware and knowledge. From a development perspective, appropriate deployment of technology is essential. Technology influences the investment need, depending on whether it is capital intensive (labour saving) or labour intensive. There is an unprecedented accumulation of technological capability in the world today. Much of it, however, remains unrecognized, underutilized and inadequately shared.

54. Financial assistance and technology transfer are interrelated components of international development cooperation. Technology transfer is a form of resource flow and can normally be achieved without any large-scale expansion of financial transfers. Technology transfer aims to bridge three major types of gaps: (a) between innovation and commercialization, (b) between technologies in use in developed and developing countries, and (c) among technologies available to different developing countries.

55. No single technology or set of technologies can be appropriate in all countries: optimizing technology for the great variety and combination of situations is challenging. Technologies cover different ecological zones, socio-economic needs and pressures, and environmental considerations. They also cover a large number of activity groups, such as forest-resource development, reforestation, sustainable harvesting, processing and value addition, integrated waste management, product development and marketing, and promoting interface activities. Considering the decrease of area under forest cover and the increase of demand placed on it, technological innovations will be a driving force for sustainable forest management. The transfer and exchange of technology has increasingly been facilitated by developments in information technology.

56. The transfer of technology from developed to developing countries takes effect in different ways; private entrepreneurs, bilateral and multilateral assistance agencies, institutions of the Consultative Group on International Agricultural Research (CGIAR) and regional research institutions, non-governmental organizations and foundations are all involved. Foreign investment in developing countries is often associated with a technology package, including management and marketing contracts, foreign equipment and patented technology, examples of which can be seen in the forest-based industries of several developing countries.

57. Bilateral and multilateral forestry projects are a common means of achieving technology transfer. There are many national and regional forest research institutes that have long received international assistance. FAO technical publications provide updated technical information on almost all aspects of forestry, such as mangrove forest management guidelines, biotechnology in forest treat improvement, a model code of forest harvesting practice and non-wood forest products for income generation and sustainable forestry.

58. The People and Plants Initiative (jointly backed by WWF and RBG Kew) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the database of the United Nations Environment Programme (UNEP) on environmentally sound technologies, the Zero Emissions Research Initiative of the United Nations University (UNU), the Medicinal Plants Programme of the World Health Organization (WHO), and the programme of the United Nations International Development Organization (UNIDO) on industrial processing and marketing are some of the many examples of multilateral technology transfer.

A. Technical cooperation among developing countries

59. Apart from North-South technical cooperation, TCDC is becoming an effective medium of South-South technology transfer. Sharing of experience by developing countries can happen through direct exchange or through formal and informal networks; the Latin American Dendroenergy Network, the African Forest Action Network and the Asian Network on Medicinal and Aromatic Plants are some of the many active ones. UNDP and other United Nations bodies operate technical cooperation among developing countries (TCDC) programmes that could be applied more directly in technology transfer for forestry. TCCT needs stronger support and development.

60. Developing countries will only be able to advance rapidly to state-of-the-art technologies, avoiding mistakes and delays, if their capability level is adequate. In most cases, the experience and technologies of developed countries do not automatically translate into lessons and tools for developing countries; each country will proceed along a path suited to its own unique circumstances and influenced by a multitude of factors.

B. Research

61. While all CGIAR institutions have some forestry-related activities, the Centre for International Forestry Research and the International Centre for Research in Agroforestry are directly concerned with forestry and conduct programmes on policy development; the management and conservation of natural forests; the reforestation of degraded lands; products and markets; the environmental and economic characterization of land-use systems and the validation of technologies and issues related to their adoption; multipurpose tree improvement; and component interaction between trees and crops. There are also regional centres/institutions engaged in research and technology transfer on specific aspects of forestry within their respective regions, such as the International Centre for Integrated Mountain Development, the Inter-American Institute for Cooperation on Agriculture, the Tropical Agriculture Research and Training Centre, the Institute of Forest Management of the Association of South-East Asian Nations (ASEAN) and the ASEAN Timber Technology Centre.

62. Activities related to forestry research in developing countries and technology transfer are found in some developed countries institutions, including the Canadian International Development Research Centre, the East-West Centre, the Natural Resources Institute of the United Kingdom of Great Britain and Northern Ireland, RPG Kew, the International Cooperation Centre of Agricultural Research for Development of France, the New York Botanical Gardens, the Australian Centre for International Agricultural Research, the French Institute for Scientific Research and Development Cooperation, the Division of Forestry of the Commonwealth Scientific and Industrial Research Organization, the Forestry Service of the United States Department of Agriculture, and the Tropenbos Foundation. Globally, ODA for forestry research amounts to about 5 per cent of total ODA to the sector, the corresponding figure for agriculture being 10 per cent. A number of international non-governmental organizations and foundations support research and technology transfer.

63. Investment in forestry research in most developing countries has traditionally been low, resulting in a smaller number of forest scientists compared with those engaged in agricultural research, as well as a lower level of training and inadequacy of infrastructure and facilities. The measure of forestry research expenditure for developing countries as an average percentage of the recorded value of forest products ranges from 0.05 to 0.1 per cent, compared with about 0.5 per cent for agriculture. Research efforts are far from sufficient, and the lack of consultation with the users of research results and neglect of the subsistence sector lead to continued unsustainable practices; in most cases, there is hardly any participation of the private sector. The so-called technology triangle of academia, business and government is essential for developing and expanding a country's national technological capability. Finally, the area of indigenous technologies in developing countries is only beginning to be explored.

IV. DEVELOPMENT ASSISTANCE

64. The Forest Principles emphasize the need for international cooperation and technical and financial support for the management, conservation and sustainable development of forests. International financing on concessional terms is required for supporting capacity-building, technology improvement, infrastructure development and conservation, and to internalize global externalities.

65. The estimate of the annual need for concessional financing for implementing chapter 11 of Agenda 21, "Combating deforestation" during 1993-2000 is $5,670 million (not including forestry components of other chapters, particularly chapters 12, "Managing fragile ecosystems: combating desertification and drought" and 13, "Managing fragile ecosystems: sustainable mountain development").

66. ODA for forestry is a relatively new phenomenon, having started in the early 1960s; it has grown to $1,545 million for 1993. Dependence on foreign funds in developing countries varies widely: the share of ODA in the total government resources for forestry was about 10 per cent for Indonesia and Malaysia, whereas it was over 80 per cent for Bangladesh and the Philippines (see table 1).

A. Bilateral assistance

67. In 1993, total revenue flows to developing countries from countries that are members of the Organisation for Economic Cooperation and Development (OECD) amounted to $160 billion, of which development cooperation flows accounted for $55 billion. Bilateral aid for forestry in the same year was $916 million, only 1.7 per cent of the total (see table 4); this would seem to reflect a very low priority.

68. There are some 20 donor countries providing bilateral assistance for forestry. Bilateral assistance funds are mainly channelled through special assistance agencies in the donor countries. Donor countries also contribute to

multilateral and non-governmental organization programmes (see paras. 71-82 below). It is important to note that some 80 per cent of all development assistance derives from six of the G-7 countries (the United States of America, Germany, Japan, France, the United Kingdom of Great Britain and Northern Ireland and Canada), whether it is channelled in bilateral or multilateral form. Clearly, changes in aid-fund resource availability in these countries affects the multilateral and other international agencies.

69. Bilateral donors have their own priorities and preferences for recipient countries and programme focus, and some even have a regional focus. Donor interest is sometimes confined to specific aspects of forestry. Some aid appears to be linked to equipment from donor countries, but most is not. Forestry-related donor policies are also influenced by several new trends: the growth and increased strength of non-governmental organizations; the increasing globalization of forestry issues; increased awareness of social and environmental issues; and the rapid economic growth occurring in some developing countries. In view of the differences in the priorities and preferences of donors, the coordination of development assistance at the country and global levels continues to be essential to ensure complementarity of assistance action.

70. Since 1992, there has been a decline in aid flows. Several countries have either revised their aid commitments or frozen aid at its current nominal levels. The reasons attributed for the change are recession and structural unemployment in OECD countries; increased social needs in many donor countries; rapidly increased peace-keeping commitments; and disillusion with what can be accomplished through development cooperation.

B. Multilateral assistance

71. Multilateral organizations can be grouped as development banks, United Nations and other international organizations, international non-governmental organizations, regional organizations and CGIAR institutions.

1. Multilateral development banks

72. The World Bank, the African Development Bank (ADB), the Asian Development Bank (AsDB), the Inter-American Development Bank (IDB) and the International Fund for Agricultural Development (IFAD) are the main multilateral development banks involved with forests. The first four have been directly involved in financing forestry projects; the involvement of IFAD has been indirect, through agricultural projects incorporating tree planting. Increasingly, sustainable forest management is featuring in the policy documents of these banks, as well as in loan and grant agreements.

73. Among the multilateral development banks, the World Bank is by far the single largest funding source for forestry: total World Bank lending of $115 million during 1967-1976 had increased to $1.8 billion for the 1977-1986 period. During 1993, World Bank forestry lending was $276 million. There are currently 25 active forestry projects funded by the World Bank, spread over 20 countries. The World Bank is also, along with UNDP and UNEP, a managing partner

of the Global Environment Facility (GEF), which funds forest-related projects through its focal areas.

74. Since 1978, ADB has funded 14 projects for a total of $337 million; since 1977, AsDB total lending for forestry has amounted to $840 million; IDB forestry lending has risen to $65.3 million since 1993. The lending profile of these banks is similar: currently, no funding is provided for forest harvesting or forest-based processing industries.

2. International organizations

75. Technical support for forestry in developing countries is provided by a number of United Nations and other intergovernmental bodies including FAO, the International Labour Organizations (ILO), the International Trade Centre/World Trade Organizations, ITTO, UNDP, UNEP, UNESCO, UNIDO, the World Food Programme (WFP) and WHO.

76. UNDP provides financial/technical assistance, particularly through country programme allocations. In 1993, UNDP provided $33.5 million world wide for forestry. These funds are designed to promote multisectoral and programme-wide approaches to forest management. The UNDP-administered component of GEF funding, in its pilot phase (1992-1994) included approximately $80 million for biodiversity projects, of which $60 million were for forest-related projects, mostly in Asia and Africa, with significant but smaller programmes in Latin America and the Caribbean, the Arab States and Eastern Europe. A smaller number of forest-related climate change mitigation projects were also undertaken.

77. In 1993, UNDP launched its Forestry Capacity Programme, which provides central funding to countries who best meet programme criteria. Relying on building national capacity, programmes support participation, an integrated cross-sectoral approach and donor coordination for more effectively managed national forest programmes. The pilot programmes, funded by donors at $4 million, have demonstrated the potential of the approach.

78. WFP is involved in watershed management, social/village forestry, fuelwood plantations, land rehabilitation, sand dune stabilization and shelter belts. The WFP contribution to forestry-related activities in developing countries amounted to $121 million in 1993. WFP emphasis appears to be shifting from development through food-for-work programmes to emergency assistance. Since 1993, WFP has approved only $37.2 million in assistance for forestry projects.

79. Internationally, FAO is the principal specialized agency in forestry and is active in many areas. Its normative activities are funded from regular budget allocations. It also implements field projects financed by UNDP, multilateral development banks and bilateral donors as well as by its own Technical Cooperation Programme. The FAO annual regular programme budget for forestry has been about $13 million; for the forestry field programme, it is about $55 million.

80. ITTO has an annual administrative budget of $4 million and is currently mounting country projects at a cost of approximately $15 million. Between 1990

and 1995, ITTO approved grants of a total value of $88.3 million for projects related to trade, forest products, forest management and reforestation.

81. UNEP has been closely involved with activities relating to biodiversity and desertification control, particularly the development of conventions. The UNESCO Man and the Biosphere programme, People and Plants programme and Botany 2000 initiative, as well as a number of its scientific activities, are relevant to forestry. UNIDO is involved in promoting and developing technologies for secondary wood products and phytochemicals/ phytopharmaceuticals.

3. Non-official assistance agencies

82. A number of other organizations support countries in taking effective action for forestry development, including international non-governmental organizations, regional organizations, and CGIAR institutions. International non-governmental organizations involved in forestry differ widely in their scope and interest; the International Union for the Conservation of Nature, WWF, the International Union of Forestry Research Organizations, the International Institute for Environment and Development, the World Resources Institute, the International Technical Tropical Timber Association, CARE International, OXFAM, Conservation International, AT International, the Brothers of the Christian Schools, the Global Forest Policy Project and the World Watch Institute are among those actively involved. IUCN operates on a total budget of some $48 million annually focused on conservation. Many non-governmental organization programmes are financially supported by bilateral and multilateral agencies.

C. Trends since the United Nations Conference on Environment and Development

83. Although the United Nations Conference on Environment and Development (UNCED) established a case for increased support for forestry, overall ODA has actually declined. Panayotou (1995) notes that the chances of raising ODA are minimal in view of the political difficulties of donor countries in maintaining even current levels of ODA. In addition, the outflow of resources from the South for servicing foreign debt far exceeds the inflow of resources from development assistance. The recent trend of decline in ODA is therefore of grave concern. ODA to agriculture fell from $14.0 billion in 1991 to $4.8 billion in 1993.

84. The total ODA to forestry showed a large increase in the 1980s and then a small increase from $1.4 billion in 1990 to $1.5 billion in 1993 (see table 2). ODA in 1993 was comprised of 71 per cent grants and 29 per cent loans. When this ODA level is compared with the need estimated in Agenda 21 ($5.67 billion) it amounts to only 27 per cent of that figure.

Table 2. Official development assistance for forestry, 1986-1993

(Millions of United States dollars)

Categories of donors	1986	1988	1990	1993
Bilateral aid	434.5	723.0	937.3	915.7
Development banks	142.5	200.3	253.7	420.3
United Nations organizations	188.0	191.6	234.3	208.5
Total	765.0	1 114.9	1 425.3	1 544.5

85. The forestry funding provided by all United Nations organizations in 1993 totalled $208 million, of which $121 million came from WFP. Other intergovernmental bodies, including FAO, UNDP, ITTO and UNEP, provided a total of $87 million, or only 5.7 per cent of total ODA for forestry.

86. Under bilateral cooperation, European Union countries gave nearly 40 per cent of total ODA (54 per cent of total aid in the form of grants). Globally, bilateral cooperation represents 59 per cent of total aid (80 per cent of total aid in the form of grants). It should be noted that part of this is in the form of trust funds for international agencies, particularly FAO.

1. Official development assistance by geographic region

87. Table 3 describes ODA for forestry, by geographic region. Asia and the Pacific remains the principal beneficiary (37.2 per cent), followed by Africa (30.6 per cent). More information is needed on which countries receive what level of international cooperation, and whether that distribution is rational and effective.

Table 3. Share in official development assistance, by region, 1993

(Millions of United States dollars/percentage)

Region	Bilateral		Development banks		Multilateral organizations		Total	
Africa	323.6	35.3	58.0	13.8	82.4	39.5	472.0	30.6
Asia/Pacific	261.4	28.5	248.0	59.0	68.0	32.6	574.3	37.2
Latin America/Caribbean	208.4	22.8	84.5	20.1	19.8	9.5	315.7	20.4
Near East and North Africa	36.9	4.0	18.9	4.5	20.6	9.9	77.5	5.0
CIS a/ and Eastern Europe	10.0	1.1	10.9	2.6	1.7	0.8	21.9	1.4
Global	75.4	8.3	0	0	16.0	7.7	83.1	5.4
Total	915.7	100	420.3	100	208.5	100	1 544.5	100

a/ Commonwealth of Independent States.

88. Funding of all the multilateral organizations are now at zero growth or declining, and prospects for new and additional funds appear to be weak. In any case, the ODA growth rate experienced during the period 1986 to 1990/1991 can hardly be expected to recur.

2. Donor priorities

89. In a 1994 FAO survey, donors were asked to indicate the degree of priority (very high, high, medium and low) that they would give to each of 25 proposed areas. Based on donors' response, the priorities are as follows:

(a) Very high priority: country capacity-building; the management of natural forests and social forestry; forestry research;

(b) High priority: country capacity for policy and planning: agroforestry, watershed management and land-use management;

(c) Medium priority: desertification control; extension; national parks and the conservation of genetic resources; forestry legislation; non-wood forest products; forest protection;

(d) Low priority: wildlife management; fire protection; industrial plantations; industries; trade; the marketing of forest products.

D. Shortcomings of the official development assistance system

90. Past evaluations of ODA projects/programmes have identified several shortcomings, which are essentially institutional in nature and, therefore remediable, as follows:

(a) There are a large number of donors providing ODA, which have differing policies, priorities, eligibility criteria, modalities and rules. Conflicts of various nature arise because of such differences among providers of ODA within each group (bilateral, multilateral, non-governmental organization), among these groups and between donor groups and recipients;

(b) When donors have the same preference for countries and similar priorities, they often compete among themselves, thus diluting the effectiveness of assistance. Cooperative management and co-financing of projects/programmes does not occur often enough;

(c) Because of the country preferences of bilateral donors, ODA does not get evenly distributed among countries according to their needs;

(d) ODA projects are often decided on an ad hoc basis without any analysis of their linkages and relevance to overall goals of development;

(e) The policies and priorities of donors and recipients often conflict. As a result, some of the high priority needs of developing countries remain unattended and national programmes are patchy rather than comprehensive;

(f) It is very difficult for recipients or anyone else to be well informed on the multiplicity of changing programmes, funds, criteria and procedures that exist. They lack adequate knowledge and capacity to receive access and implement ODA;

(g) Projects are often prepared without sufficient national/local involvement, resulting in the introduction of inappropriate technology and dependence on foreign experts;

(h) There has been a proliferation of frameworks for environmentally sustainable development planning, causing confusion and dissipation of efforts;

(i) The ratio of local funding to ODA funding in projects is small, raising questions about the capacity of recipient countries to maintain investments once external assistance comes to an end;

(j) There is often insufficient national ownership and commitment, resulting in a lack of positive impact and a lack of adequate technical skills and capability to absorb the benefits of assistance.

91. Overall, ODA is observed as being rarely adequate and predictable: its preparatory procedures are often elaborate and time-consuming, and conditionalities have blocked, delayed or interrupted development assistance.

E. Improved mechanisms

92. Considering the crucial importance of ODA, such constraints need to be removed effectively and immediately through simple and innovative procedures. In order to improve its effectiveness, ODA planning for forestry should be undertaken as a joint/collaborative effort of donors and recipients.

93. At the global level, it is necessary to resolve the conflicts among donors and among technical assistance agencies and to arrive at a common strategy and coordinated approach in setting priorities, country preferences, funding levels and mechanisms, including the integration of diverse frameworks. Where more donors are interested in the same country and programme area, cofinancing activities can help to coordinate ODA delivery: cofinancing multiplies each donor's impact, and cofinanciers may have complementary skills and expertise that they can use in a joint fashion.

94. The international community has realized that coordination and cooperation in the identification of needs and opportunities for investment and technical assistance are just as critical, if not more so, as cooperation and coordination in the financing of such needs and opportunities once they are identified. This recognition was indeed one of the major forces that led to the establishment of the Tropical Forests Actions Programme in 1985.

95. At the national level, all ODA activities related to sustainable forest management need to be coordinated and effectively incorporated into the overall forestry programme of each country; countries should designate an appropriate agency to undertake this responsibility; for example, in Indonesia the National

Development Planning Board undertakes coordination through the Consultative Group on Indonesian Forestry.

96. It is generally recognized that project lending and project-oriented investment often do not result in balanced growth of the forestry sector, due to overlaps, conflicts, duplication of efforts and inefficiency in the use of resources. The World Bank and other multilateral development banks are accordingly advocating a broad sectoral approach to investment lending. A sector investment programme is to be based on a sector strategy and policy framework, and it should cover all sector expenditures, current and capital, and involve all stakeholders. This would help to avoid shifting priorities and increase the focus on policy dialogue between donor and host countries so as to ensure that there is mutual understanding of objectives and clear agreement on strategies and conditions of performance for loans or grants; it would also improve inter-agency cooperation and coordination.

97. This approach calls for high planning capability and continuity of programme funding and is consistent with recent UNDP emphasis on a programme approach. General Assembly resolutions on United Nations resident coordinators and country strategy notes may also provide a framework and mechanism for initiating such programmes.

98. Based on the principles of sectoral approach developed by the World Bank and others, UNDP has developed a concept of forest partnership agreements (FPAs) between country and donor communities so that national commitments and donor support for implementing forestry principles and procedures specified in Agenda 21 can coalesce. Establishment of a special forest partnership facility in FPA countries is also envisaged. FPAs can help to establish large financing packages based on multi-donor sectoral funding. They would focus on countries with a strong national commitment to bring deforestation under control, and would also focus beyond the forest sector on the underlying causes of deforestation.

V. INNOVATIONS IN FUND MOBILIZATION

99. In recent years, a number of innovations have been introduced for mobilizing funds for forestry, some more successful than others. Some new mechanisms are still in their early stages, and others are still at a conceptual stage. Such innovations can be considered under two broad headings, external and domestic.

A. External resource flows

100. Foreign investment and ODA, including such arrangements as cofinancing, matching grants and GEF, have been discussed above. Global environmental values of forests offer possibilities for debt swapping and other means of trading through international transactions. Several innovative and interesting ideas for the international acquisition of funds for forestry have recently been raised, and some are being tried with encouraging results, such as debt-for-nature or debt-for-sustaining-forests swaps, carbon offsets, internationally

tradeable emission permits, tradeable development rights, biodiversity patents and matching funds for sectoral reforms.

101. Debt-for-nature swaps were an early innovative financial mechanism. Begun in 1987, they continued after UNCED and by December 1992 had generated approximately $76 million for conservation in developing countries. These small-scale transactions need to be greatly expanded to attract the serious attention of finance ministers. In such arrangements, international debts can be purchased or swapped in return for environmental safeguards, such as establishing nature reserves, or, as suggested recently, in return for guarantees of sustainable management of forest resources. In order to promote policy reforms in forestry, the concept can be widened to include debt-for-policy reform swaps, or even possibly to debt-for-sustainable-development swaps.

102. Carbon offsets are arrangements by which, for example, a developed country power utility finances reduced-impact logging, enrichment planting, forest protection or reforestation in a developing country in order to sequester carbon and offset emissions. Several such pilot offsets have been initiated in recent years.

103. Internationally tradeable emission (carbon dioxide) permits could be used to finance the protection of forests. Such a mechanism could allocate a certain level of allowable emissions in the form of tradeable permits or obligations, based on some internationally acceptable formula. If countries exceed the limits, they can purchase or trade emission permits with countries that have an excess supply of permits. The concept raises questions of equity and sovereignty.

104. Tradeable Development Rights (TDRs) are comparable in conception to tradeable emission rights, and could be used to conserve biodiversity both within a country and globally. Developing countries could set aside habitats for biodiversity conservation, dividing them into a number of TDRs. The TDRs could be sold to firms, foundations, developed country Governments, universities and research institutions. Some would buy it for direct use (prospecting for biochemicals) and others to save them from commercial exploitation. Developed countries could stimulate demand for these by providing credits to domestic firms and property owners for the acquisition of TDRs.

105. Additionally, at the international level, commercial private-sector efforts to follow up UNCED are promoted by such groups as the International Network for Environmental Management in Germany and the Business Council for Sustainable Development (BCSD) in Switzerland. BCSD has established task forces on, inter alia, internalizing social and environmental costs in prices, and conducting a global study on the environmentally sound production and use of paper.

B. Domestic resource flows

106. Domestic resource falls under two categories: government resources and private resources.

1. Government resources

107. Apart from royalties charges, a large number of innovative measures can be and are being applied to improve domestic resource flows for forestry (see also paras. 25-39), such as:

(a) Objective-oriented taxation: specific charges can be imposed on forest products for such purposes as afforestation, forestry education and training and forestry research;

(b) Attributable reimbursements: other sectors/activities may be required to pay for the benefits derived. For example, Colombia has planned to divert income from coffee price-support payments by the European Union to sustainable forest management;

(c) Beneficiary taxes and payments: taxes for the enjoyment of non-marketed benefits, such as tax to be paid by downstream beneficiaries of upland conservation. These are in fact payment for services. This type of arrangement has been used in Japan for many years, and Colombia has a law that requires a percentage of revenues from hydropower sales to go into a fund that supports upland watershed management and conservation activities. Similar approaches exist in a number of other countries;

(d) Watershed charges: these payments for damages inflicted can be imposed on loggers and others who damage upland ecosystems;

(e) Licence fees/charges on non-damaging uses: fees or user charges on permits for ecotourism/scientific tourism and bioprospecting;

(f) Reduction/removal of environmentally damaging subsidies: for example, removing subsidies for activities leading to (or encouraging) deforestation, such as agriculture, mining, irrigation, hydropower;

(g) Full-cost pricing: several forest products and services are supplied to users at below cost, such as fuelwood, water supplies;

(h) Increased rent capture: more information on this has been given above;

(i) Fines on wasteful use and wilful damage to forests: this provision can be seen in many forest utilization contracts and may be enforced through deposit of bonds;

(j) Deforestation charges/taxes: similar to item (i) above and often linked to the afforestation cost involved.

2. Private resources

108. A number of successful cases of innovations to mobilize private resources have been described above. People's participation of a different nature (single tier or multi-tiered; individual initiatives or cooperative action) and private-

sector involvement can considerably improve the flow of funds. Increased non-governmental organization involvement can be facilitated by the establishment of offices or "windows" within existing organizations that would accept proposals for projects from the non-governmental organization community. Industries using forest products can be encouraged to participate in developing forest resources; for example, tobacco and tea manufacturing industries could participate in developing fuelwood plantations. Targeted approaches, such as joint forest management (JFM) in India and extractive reserves in Brazil, have produced encouraging results. Under JFM, government forest departments and local communities have successfully entered into forest management agreements that benefit both parties.

109. A newly suggested mechanism is tradeable reforestation credits, which aims to provide an incentive for private landowners to encourage them to keep their land under forest cover or reforest it. Landowners who keep their land under forestry receive a tax credit against their general tax obligations, and smallholders who do not pay taxes can sell their credits to wealthier people who do. Costa Rica has been using this instrument, integrating it with carbon offsets.

C. Institutions to support targeted financing for forestry

110. The innovative mechanisms discussed above have conceptual strength. However, their success depends on strong and innovative institutions that can implement and enforce the mechanisms. Current institutions, both nationally and internationally, will need substantial strengthening and reform to implement such innovative mechanisms.

111. At the national level, the establishment of a national forestry development fund (national forestry fund) with decentralized funding structures could support forest conservation through the reinvestment of forestry income into forest resource development. It could also help to meet private-sector environmental financing needs. A centrally managed fund could incorporate several of the above-mentioned mechanisms and serve as an effective agent for fund mobilization. It would help the implementation of sector investment programmes for forestry and could effectively handle any forest partnership facility that might be established on the basis of forest partnership agreements. This would in turn help to strengthen alliances of public institutions, donors and financing agencies, Governments and the global community. Such a fund could be structured along similar lines to those of some of the agricultural financing institutions, such as agricultural banks and agricultural finance corporations, that already exist in several countries, or it could be an affiliate of such existing financing institutions with a special window for forestry.

112. The advantages and improved effectiveness of global level funding mechanisms for forests is a central issue for the consideration of the Panel. Proper consideration will require careful analysis and broad understanding of the strengths and shortcomings of the present funding system.

VI. CONCLUSIONS AND OPTIONS FOR FURTHER CONSIDERATION BY THE PANEL

113. In spite of the commitment of countries and the international community to pursue Agenda 21 and the Forest Principles, real investment for sustainable forestry development remains negative. The net annual forestry investment of US$ 31.25 billion for the period 1993-2000 that was envisaged by UNCED, with a component of US$ 5.67 billion of concessional financing, is far from being realized. Increased funding and improved technology are the twin engines needed to propel a take-off towards sustainable forestry. But fund mobilization is generally weak in developing countries: public resources are the mainstay for forestry development in most cases, and available resources and capability are far from adequate. In circumstances of inadequate resources for forestry, an early casualty has been budget allocations for research and technology development.

114. Foreign investment and ODA are important for many countries, particularly in Africa. The current level of ODA in forestry is only 27.2 per cent of the amount specified in Agenda 21; moreover, in the present-day economic climate, increase in ODA is unlikely.

115. The forestry sector today is riddled with problems and constraints that call for action on multiple fronts, and the resources needed are having to be mobilized by the countries themselves; the ODA role can only be catalytic. There is a need to promote the involvement of the people and the private sector. All means of mobilizing financial resources need to be fully tapped. Traditional measures of revenue generation and allocation, or funding based on timber production alone, are no longer appropriate. Innovative measures are required for generating funds based on the immense externalities and environmental benefits of forests, requiring effective and sophisticated mechanisms. In addition, a strong development partnership is called for among government institutions, private establishments, assistance agencies, research institutions and non-governmental organizations, and indications suggest the need for a sectoral approach to forestry development, supported by appropriate policies, strategies and regulatory mechanisms. The improvement and development of technology needs to be assigned its due importance, and wherever technology is acquired, there will be a need to adapt it to the specific situations in the country.

Options for further action

116. The Panel may wish to consider the following options to advance the agenda on finance and technology transfer:

(a) In view of the inadequacy of information on investment in forestry, the Panel may wish to urge its member countries to support activities to update and gather more information, especially information on current domestic investment in forestry. The Panel may also wish to provide guidance on institutional arrangements, procedures and mechanisms for the coordination of data collection, analysis and dissemination;

(b) Since there has already been a current shortfall in financing forestry programmes and it is unlikely that ODA contribution will increase substantially from its current rate, the Panel may wish to provide guidance on measures to sustain ODA contributions to forestry;

(c) Since forestry projects, including sustainable forest management, are not separately covered under GEF, the Panel may wish to consider the case for forestry projects that are specifically related to sustainable forest management and have direct implications for the global environment to be fully covered under GEF;

(d) There is a tendency among donors and lending institutions to give a higher priority to projects on conservation and protection, and a lower priority to projects on industry and marketing. Since successful forest management is closely related to the ability to generate revenues and add more value to forest products and services, the Panel may wish to urge donor countries and lending institutions to review their policies on fundings to take into account the need to give equal importance to forest industry and trade as a strategy for achieving sustainable forest management in the developing countries;

(e) In view of the need to increase effectiveness in coordinating project funding among donors, the Panel may wish to give its view on the approach taken jointly by UNDP and the World Bank of involving both donors and recipient countries as partners in planning ODA for forestry. Such partnership agreements between donors and recipient countries could help to establish large financing packages based on multi-donor sectoral funding;

(f) Strong and dynamic institutions are required to drive efforts to achieve fund mobilization and the acquisition of technology. The Panel may wish to discuss the need to set up, at the national level, mechanisms for fund mobilization and financing in the form of national forestry funds and mechanisms for technology development and dissemination in the form of national forest technology centres;

(g) In view of the large amounts of private-sector financial flows and the need to complement these from ODA, the Panel may wish to consider urging donor countries to formulate incentives to encourage their private sector to invest in the development of forest resources in developing countries. Long-term investment in the development of forest resources in the developing countries would complement current investments in forest processing subsectors;

(h) An international workshop on finance, to be held in South Africa from 4 to 7 June 1996 and co-sponsored by Denmark, South Africa and UNDP, will focus on the feasibility and economic potential of various innovative financings. The Panel may wish to review the outcome of the workshop at its third session.

Table 4. Change in volume of official development assistance devoted to forestry, 1986-1993

(Millions of United States dollars)

	1986	1988	1990	1993	1990-1993 Annual variation
Bilateral					
Australia	2.7	5.3	6.3	11.0	+4.7
Canada	79.8	75.1	113.4	48.6	-64.8
Japan	20.5	83.0	117.2	84.0	-33.2
New Zealand	4.0	4.1	4.5	3.3	-1.2
Norway	6.7	12.6	6.1	11.2	+5.1
Switzerland	13.1	22.9	22.5	28.0	+5.5
United States of America	54.6	117.0	149.6	121.0	-28.6
Subtotal	181.4	320.0	419.6	307.1	-112.5
Austria	0.1	0.1	0.2	0.1	-0.1
Belgium	1.9	0.9	1.6	1.4	-0.2
Denmark	10.0	29.3	30.4	10.0	-20.4
Finland	31.2	22.0	36.8	28.0	-8.8
France	42.9	(42.9)	(42.9)	30.5	-12.4
Germany	34.0	147.3	203.0	173.1	-29.9
Ireland	0.3	0.2	0.2	(0.2)	-
Italy	a/	11.2	(11.2)	8.0	-3.2
Netherlands	28.5	32.1	46.0	60.6	+14.6
Portugal	0.1	0.1	0.1	(0.1)	-
Spain	a/	0.9	0.3	(0.3)	-
Sweden	49.1	57.9	72.0	37.1	-34.9
United Kingdom	35.2	23.1	28.5	45.2	+16.7
Subtotal	233.3	368.0	473.2	394.6	-78.6
European Commission	19.8	35.0	44.5	214.0	+169.5
Subtotal	253.1	403.0	517.7	608.6	+90.9
Total bilateral	434.5	723.0	937.3	915.7	-21.6
Multilateral					
AfDB	2.7	1.0	3.0	5.0	+2.0
AsDB	9.0	77.0	71.4	74.0	+2.6
IADB	8.5	6.8	9.8	65.3	+55.5
World Bank	122.3	115.5	169.5	276.0	+106.5
Subtotal	142.5	200.3	253.7	420.3	+166.6
ITTO b/	0	3.6	12.8	15.5	+2.7
FAO c/	10.8	11.4	14.8	14.1	-0.7
ILO	2.8	2.0	0.6	0.2	-0.4
UNDP	22.0	24.9	52.0	33.5	-18.5
UNEP	1.7	1.5	0.1	1.1	+1.0

	1986	1988	1990	1993	1990-1993 Annual variation
UNESCO	1.2	1.8	0.5	2.4	+1.9
UNIDO	2.0	2.8	2.8	0.4	-2.4
UNSO	15.0	12.2	18.1	10.0	-8.1
WFP	132.5	131.4	132.6	121.0	-11.6
GEF d/	0	0	0	10.3	+10.3
Subtotal	188	191.6	234.3	208.5	-25.8
Total multilateral	330.5	391.9	488.0	628.8	+140.8
Grand total	765.0	1 114.9	1 425.3	1 544.5	+119.2

Note: Figures in brackets ( ) are taken from preceding survey; official figures unavailable.

a/ Estimates unavailable.

b/ Total budget plus special funding for projects.

c/ Total budget of the FAO Forestry Department plus special funding for projects.

d/ Spending on forestry components of GEF projects.

Notes

1/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigenda), resolution 1, annex III.

2/ Ibid., annex II.

UNITED NATIONS **E**

Economic and Social Council

Distr.
GENERAL

E/CN.17/IPF/1996/6
20 February 1996

ORIGINAL: ENGLISH

COMMISSION ON SUSTAINABLE DEVELOPMENT
Ad Hoc Intergovernmental Panel
on Forests
Second session
11-22 March 1996

SCIENTIFIC RESEARCH, FOREST ASSESSMENT AND DEVELOPMENT OF CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

Programme element III.1 (a): Assessment of the multiple benefits of all types of forests

Report of the Secretary-General

SUMMARY

The present report relates to category III, Scientific research, forest assessment and development of criteria and indicators for sustainable forest management, of the work programme of the Ad Hoc Intergovernmental Panel on Forests (IPF). As requested by IPF at its first session, the report addresses programme element III.1 (a), on assessments of the multiple benefits of all types of forests.

One of the fundamental questions raised concerns the uses and ways to expand the Forest Resources Assessment (FRA) of the Food and Agriculture Organization of the United Nations. It is seen as necessary to distinguish between users and user needs at the national and international levels. The two levels have common characteristics, but each also has its specific requirements and consequently a specific approach to data collection and reporting. While reliable country data are a major input to global assessments, the conclusions of the global assessment, providing country-by-country information, are only of limited use for planning at the national level.

National forest inventories are essential for the preparation and implementation of national forestry action plans and/or programmes. The information needed is specific to each forest site and its current condition

96-03190 (E) 220296 270296

and to each enterprise and its production goals. It includes data on factors not related to wood production. Besides data collected from forest inventories, long-term experimental observations on the response of forests to various treatments are important. They serve as inputs to model studies for simulating the development of forests under alternative forest management options.

At present the FAO FRA provides global coverage and produces results by country and subnational unit. Only data on country and higher levels are published. More detailed, geo-referenced information is available for scientific purposes.

The results of an inquiry conducted by FAO/ECE in the context of future global assessments shows that most of the developed countries have the capacity to collect, analyse and use data related to traditional forest management oriented towards wood production. Monitoring of change, however, is very uneven from country to country. In the developing countries the existing institutional capacity is either inadequate or too weak to collect and update basic information related to forest coverage and types of forests, species composition, existing growing stock and volume of harvest. A table is provided summarizing the situation at the end of 1990. Although only a few countries are collecting information on the environmental functions of forests and their non-wood benefits, those benefits are well recognized in many countries, and recognition is growing.

The report urges that high priority be given to capacity-building with a focus on the development of national strategies for the management of forests. The work carried out in the forest resources assessment of 1990 should continue in two areas: data collection based on existing reliable country information; and sampling of high resolution satellite date; environmental parameters, including biological diversity, soil and water conservation and vegetation degradation; cooperation with other organizations in order to join resources and share results; and efforts to harmonize concepts, terminology, definitions and classifications.

CONTENTS

	Paragraphs	Page
INTRODUCTION	1 - 5	4
I. USES AND USERS OF INFORMATION ON FOREST RESOURCES	6 - 11	4
A. National level	7 - 10	5
B. Global level	11	6
II. OVERVIEW	12 - 15	7
III. EXISTING GAPS IN AVAILABLE KNOWLEDGE AND INFORMATION	16 - 21	7
IV. APPROACHES TO THE ISSUE AND LESSONS LEARNED	22 - 43	9
A. Experiences	23 - 36	9
B. Support to developing countries	37 - 39	12
C. Lessons learned at the international level	40 - 43	13
V. FUTURE TRENDS AND PRIORITIES	44 - 46	14
VI. ISSUES FOR FURTHER CONSIDERATION	47	15

INTRODUCTION

1. The Commission on Sustainable Development at its third session established the Ad Hoc Intergovernmental Panel on Forests and outlined its programme of work, which contained five major categories of issues. Under category III, Scientific research, forest assessment and development of criteria and indicators for sustainable forest management, the Panel would "review existing periodic assessments of forests, including relevant socio-economic and environmental factors, at the global level; identify shortfalls in present assessments relative to policy considerations; and recommend practical ways of improving such assessments. Examine ways to broaden the scientific knowledge and the statistical database available in order to better understand the ecological, economic, cultural and social functions performed by all types of forests. Promote the further development of methodologies for properly valuing the multiple benefits derived from forests in the form of goods and services, and subsequently to consider their inclusion within the systems of national accounting, drawing upon work that has been already undertaken by the United Nations and other relevant organizations". 1/

2. At its first session, the Intergovernmental Panel decided that, in consideration of category III, programme element III.1 would entail the preparation of two reports, one of them identifying ways to expand the Forest Resources Assessment (FRA) of the Food and Agriculture Organization of the United Nations (FAO) "with regard to the qualitative and quantitative assessment of all types of forests, including information on biological resources and non-wood forest products and services; information on environmental and social benefits; standardization of tropical and non-tropical data; collection of broader types of forest statistics; coordination of forest monitoring with remote sensing and geographical information systems; the continuous nature of the assessment; and accessibility of information generated to all interested parties". 2/

3. The present report, prepared by FAO, as lead agency for programme element III.1 in consultation with the secretariat of the Panel in the Division for Sustainable Development of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, is in response to that decision.

4. In outlining the subject, specific reference is made to the forest resources assessments of FAO and of the Economic Commission for Europe (ECE). However, significant contributions to national and supranational information on forests have been made by numerous other actors. Reference to the work of cooperating organizations is made without attempting, to provide a comprehensive overview of their activities.

I. USES AND USERS OF INFORMATION ON FOREST RESOURCES

5. One of the fundamental questions concerning an expanded FRA is that of the uses and users of the information expected. Assuming that funding for forest resources assessment and monitoring at all levels will remain scarce, strict

prioritization will be necessary. This further underlines the need for prior analysis.

6. There is need to distinguish between the various types of users and user needs at the national and international levels. The two levels have common characteristics, but each also has its specific requirements which dictate a specific approach to data collection and reporting. While reliable country data are a major input to global assessments, the conclusions of global assessments - providing country-by-country information - are only of limited use for planning at the national level.

A. National level

7. The main users of assessment results are national/subnational land use and forestry policy makers and planners, forest managers in the public and private sector and local communities. Their information needs vary according to planning situations, broadly classified as follows:

(a) Strategic forestry planning concerned with issues of general relevance to forestry planning at the national or provincial level and to the sustainable management of forests, taking into account linkages with other sectors. The most demanding information needs in this context may be formulated as follows: What is the level of present and potential production (in a broad sense, including both goods and services) in forests and related lands, compared to the needs? How is it expected to change under alternative forest management programmes and socio-economic regimes? A subsidiary question related to the monitoring of the forests is: What is the effect of implemented policies on forest ecosystems, and in particular, on their productive and renewal capacity?

Since strategic forestry planning has to deal with intra-sectoral issues as well as intersectoral ones such as land use, energy, employment, tribal matters, education, social welfare and environment, the scope of the needed information is wide and includes variables linked with both the production and the consumption (needs) of goods and services derived from forests such as land cover and land use; economic information on forests such as volume, increment and drain; areas suitable for afforestation; species diversity; endangered species; ecological values; traditional/indigenous land-use values; biomass; demographic and socio-economic data affecting forest resources; and need of land for alternate uses such as agriculture and urbanization;

(b) Forest management planning oriented towards local activity. The typical issue is choice of place and time for interventions. The survey intensity is rather high, and mapping - more generally, large-scale geo-referenced information - is essential.

8. The information needed for forest management is specific to each forest site and its current condition and to each enterprise and its production goals. It includes data on various factors not related to wood production. Besides data collected from forest inventories, long-term experimental observations on the response of forests to various treatments are important. They serve as

inputs to model studies for simulating the development of forests under alternative forest management options.

9. In both developed and developing countries, changes in information needs relate mostly to the multifunctional role of forests in general and their environmental functions in particular. The environmental information also has global implications. Continuous research on forest inventory and monitoring techniques is needed in order to expand the scope of forest assessments to cover, in a cost-effective manner, the demand for new information.

10. A wide range of information is now needed for the preparation and implementation of national forestry action plans and/or programmes. National forest inventories constitute a basic tool and contribute to the formulation of effective national strategies for the forestry sector. The term "effective" is important, for it conveys the idea that a sound database is an essential requirement for relating investment to return, production to consumption, and conservation to development, and for ensuring that forest management achieves the goal of sustainability in the widest sense.

B. Global level

11. At the global level the main users of information are:

(a) Planners and policy makers in forestry and related development issues at the global, regional and national levels, including national Governments and intergovernmental organizations;

(b) Public investors like the World Bank, the Investment Centre of FAO, and regional banks. This is a group of international actors who work with countries within the framework of national strategies. They need complete sector-wise data and analyses;

(c) The national and international scientific community, including universities and research institutes. Two types of information needs can be identified: the first related to the question of to what extent forests and related resources can meet sustainably current and future needs of people for goods and services derived from the forest; and the second, to long-term dynamic processes such as deforestation and forest degradation, the impact they have on climate change and biodiversity, and the driving forces behind them. This group will request well-documented information and relatively raw (unprocessed) data;

(d) Certain non-governmental organizations are active as pressure groups or disseminators of information and are therefore important users of forest resources information. To avoid alarmist or misleading awareness campaigns, they need reliable and representative information - e.g., on various forest types (boreal, temperate, tropical, wet, dry, natural, plantations, monocultures);

(e) The general public and media. The need here is to raise awareness and provide objective information on the state of and change in forest and related resources. This group generally requests "digested" information on the main

trends and developments. It requires presentations that are free of jargon and easily understood.

II. OVERVIEW

12. At present FAO's forest resources assessment (FRA) provides global coverage and produces results by country and subnational unit. Only data at the country and higher levels are published. More detailed information, and geo-referenced information, is available for scientific purposes and has potentially high value for such use. A rich potential lies also in intensified use of the data produced, in the use of such data in combination with other data sets, in the furtherance of studies initiated with those data (e.g., fragmentation of the forest cover, loss of biological diversity, changes in biomass), and in improving the reliability of future collections of the type of data collected so far.

13. The methods used in the latest FRA, including the institutional memory and the information networks created around it, could be refined and enlarged for the generation of additional information. That development should, however, be guided by the following principles:

(a) Scientific soundness (e.g., a solid conceptual base, measurability) is a basic requirement for acceptance and credibility;

(b) Usefulness: information for which a clear need has been identified;

(c) Cost-effectiveness.

14. Forest resources information - like the forests themselves - has economic, social, environmental and cultural significance, and spans various sectors of the economy. This implies that inventories - from the local to the global - need to be planned, executed and reported on in a dialogue with stakeholders in all fields concerned.

15. That forest resources information has far-reaching significance can be illustrated with the forest cover change matrices produced by FRA in 1990. By showing the shift of land from one category to another, the matrices help to explain the driving forces behind phenomena such as deforestation and changes in the density and quality of vegetation. At each level, from local to global, such information is valuable for the preparation of measures to counteract undesirable change.

III. EXISTING GAPS IN AVAILABLE KNOWLEDGE AND INFORMATION

16. Programme area D, of chapter 11 of Agenda 21, identifies existing gaps as follows: "Assessment and systematic observations are essential components of long-term planning, for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies. This mechanism, however, is one of the often neglected aspects of forest resources, management, conservation and development. In many cases, even the basic information related to the area and type of

forests, existing potential and volume of harvest is lacking. In many developing countries, there is a lack of structures and mechanisms to carry out these functions." 1/

17. At the national level a number of key questions with considerable significance for strategic decisions cannot be answered at all, or only partially, or only in some countries. They concern such issues as the consequences of resource management alternatives. Answers would require knowledge of the current state of forests, their capacities to fulfil their functions and their responses to interventions of a policy nature. Such interventions can be information campaigns and/or the development of guidelines, legislation, taxation and subsidies.

18. Two knowledge gaps deserve specific mention:

(a) Direct forest dependency by people, particularly in developing countries, and the dynamics of that dependency;

(b) Availability and the consumption of need for non-wood goods and services derived from forests, and their dynamics.

19. To avoid exaggerated expectations, it must be kept in mind that it is not always lack of information that is the bottleneck factor for improving forest management. Many countries do not have the institutional capacity to design - let alone to implement - strategies for the management of their forest resources. In those cases information alone does not help. Institutional support must be given equal or higher priority.

20. What is not known (but needs to be known) at the international level is more difficult to identify. The uses and users of information need to be more precisely defined. What planning situations exist and where? What are the designs and formulations of development strategies? What type of research needs more and better information to explain the mechanisms and driving forces behind success and failures in resource management? The results produced and experience gained over the years in FAO's forest resources assessment activities will almost certainly need to be complemented, in view of the increasing demands for comprehensive information on forest resources at the national, international and global levels.

21. Supranational issues are those that call for the development of supranational or even global strategies and action programmes in which forest resources information is required for their formulation and implementation. Some of them, along with the gaps in current knowledge, are:

(a) The status of and change in the sustainable wood production capacity of the world's forests, including industrial wood and fuelwood. The global overview of a potential is missing, as is knowledge about actual harvests and needs, to be compared to that potential;

(b) The carbon cycle, which relates to the assessment of biomass. Global estimates were made in 1990 by FRA. However, they must be considered indicative only for certain countries, since the basis of field measurements is very small.

Although measurements of this type are generally costly, good estimates may be all that is needed;

(c) Deforestation and land (vegetation) degradation. Knowledge gaps exist in the understanding of processes and their driving forces and in early warning about the geographical or structural "location" of new deforestation or degradation;

(d) Biological diversity. Limiting factors include unclear concepts and, partly as a consequence, uncertainty about what should be measured and how;

(e) Forest health in the context of transboundary pollution. Basic knowledge is missing as to how to measure health (e.g., the problem of distinguishing symptoms of age or normal climate stress from symptoms of air pollution), since knowledge about cause/effect mechanisms is incomplete.

IV. APPROACHES TO THE ISSUE AND LESSONS LEARNED

22. In order to establish a realistic level of expectations, a distinction must be made between assessment on the one hand, and analysis and use of assessed data, on the other. The two should work closely together, yet they are fundamentally different. Assessment implies (repeated) observations according to defined criteria. Analysis and use of data will try to detect correlations, to find explanations, to valuate (e.g., decide what is good or bad) and draw conclusions as to required action. Thus one should not expect analytical work and extraction of consequences. Moreover, it must be recognized that different levels of precision in data-gathering are required. Although at the local level, a management unit needs considerable details and accurate data, regional and global-level policy makers are more concerned with intermediate and macro-level trends and estimates. New issues regarding forest resources develop continuously. Before assessments can make useful contributions for dealing with such new issues, a number of steps are required, in which various actors are involved and which take considerable time.

A. Experiences

1. National level

23. The multiple benefits of forests and other wooded lands - including urban and peri-urban forests - are well recognized in many countries, and the recognition is growing. However, that recognition does not necessarily lead to a formal assessment of forest resources and/or services. Many countries have focused instead on developing guidelines and management recommendations for different forest ecosystems, based only on already existing quantitative and qualitative knowledge.

24. An inquiry conducted by FAO/ECE on future global assessments shows that most of the developed countries have the capacity to collect, analyse and use data related to traditional forest management oriented towards wood production. Concerning the monitoring of change, however, the achievements so far have been

very uneven. A long tradition exists in practically all developed countries for the conduct of forest inventories for local management planning. Concerning national or provincial forest inventories, the situation also varies, from a long tradition and well targeted and state-of-the-art inventories to very insufficient information. With regard to the environmental functions of forests and their non-wood benefits, only a few countries are currently collecting information, and new efforts have to be made to do so on a large scale.

25. A forest inventory report prepared by FAO shows that in most developing countries the existing institutional capacity is either inadequate or too weak to collect and update basic information on the area and type of forests, species composition, existing growing stock and volume of harvest. The table below summarizes the present situation.

26. Most of the past and ongoing inventory/assessment activities in developing countries have depended on external funding and external expertise. Only a few countries have natural resource inventory institutions with trained personnel and the equipment needed. There is considerable variation among regions with respect to the completeness and quality of the information. There is also considerable variation in the timeliness of the information. The data are about 10 years old, on average, and may therefore not be really representative of the most recent years. Developing countries have not used the most appropriate techniques, such as continuous forest inventory designs, for change assessment, and only a few have reliable estimates of actual plantations, harvest and utilization, although such estimates are essential for national forestry planning and policy-making. No developing country has carried out a national forest inventory containing information that can be used to generate reliable estimates of the total woody biomass volume and change. Finally links with planning and decision-making are generally weak or non-existent; information is produced in isolation from its application. This implies that existing information is poorly used, and insufficient feed-back from users reaches the producers of information.

27. Developing countries have difficulty sustaining the acquired expertise and capacity, for many reasons, including inadequate funding and frequent turnover of staff. The establishment and development of proper national institutions is a basic requirement for action towards sustainable forest resources development.

28. There is now growing recognition in developing countries of the multiple benefits of forests and other associated resources. Many forest inventories have the more or less explicit objective of responding to questions related to those multiple benefits. This has led to increased scope of FRA activities, including attention to monitoring deforestation and change in vegetative cover. There are now also cases of forest inventories that assess quantities of edible fruits, and there are numerous studies of biological diversity for different purposes and using different approaches. Biomass assessment is often an extrapolation of traditional volume assessment.

Table . State of forest inventory in the tropics, 1990

Region	Number of countries under assessment	Number of countries with forest resources data at the national level							
		Forest area information (number of assessments and reference years)				Other topics covered			
		No assessment	One assessment		More than one assessment	Forest conservation and management	Forest plantations	Volume and biomass	Forest harvesting and utilization
			Before 1981	1981-1990					
Africa	40	3	23	12	2	4	8	2	4
Asia and the Pacific	17	0	1	6	10	10	8	7	7
Latin America and the Caribbean	33	0	15	9	9	11	8	9	4
Total	90	3	39	27	21	25	24	18	15

2. International level

29. An assessment of global forest resources is carried out periodically by FAO and ECE, with other national and international organizations contributing to data collection, research and studies either in specific geographical or ecological regions or on specific topics. A database is being prepared by the United Nations Environment Programme (UNEP) describing actors and their activities in the field of assessment of land use/land cover.

30. Many national and international organizations have devoted particular attention to problems of the rainforest and to producing vegetation maps, based on remote-sensing. There are prospects to enhance the usefulness of such activities by making the results of different activities complementary and compatible so that a comprehensive picture can be assembled. An initiative in this direction has been taken by the International Union of Forest Research Organizations.

31. A number of organizations are cooperating with FAO: the Joint Research Centre of the European Commission, on combining low- and high-resolution satellite data; the World Conservation Monitoring Centre, on protected areas; the EROS Data Centre of the United States Geological Survey and NASA Landsat Pathfinder, on providing and screening satellite imagery; the United States Forest Service and the Swedish University of Agricultural Sciences, on technical and statistical methodology; the European Commission, on a comparative study of European forest inventories.

32. However, the potential of coordinating activities and of sharing results is far from being fully met. There are gaps in state and change assessments based on satellite remote-sensing in dry areas with pronounced seasonal variations and in cloud-covered areas. In the developed countries, conclusive forest cover change information is incomplete.

33. The FAO forest resources assessment covering developed countries was able to draw from a relatively rich base of information produced by countries for their own needs. Nevertheless, some important weaknesses do exist: the widely varying quality of country-level data, use of different standards, and lack of secretariat resources to analyse data received and to follow up through the network of country correspondents. As a result, the final reports contain numerous gaps and inconsistencies. Moreover, the results by country do not have a common reference year (which is not considered very serious, since change processes in general are not fast), and the information collected is not presented on maps.

34. For developing countries, both the collection and the compilation of basic data are carried out at FAO. The focus, in the last two rounds of assessment (1980 and 1990), has been on change detection and on world-wide comparability. Considerable progress has been made in these fields, but comparability between developed and developing countries still needs improvement. FAO also makes the global synthesis. In the assessment of 1990 for developing countries the compilation of data was centralized at FAO and conducted by using a team of experts and consultants. This was made possible with the help of external budgetary resources in addition to FAO regular programme contributions.

35. For the tropical developing countries, in addition to the assessment based on an analysis of country data, a supplementary approach was used. In the entire tropical zone, systematic observations of forest cover and deforestation were made on a sample of multidate high resolution satellite data. This design provides information at regional and global levels on the process of change in the form of a change matrix which has relevance for land use and forest policy planning and which satisfies rather well the requirements of the scientific community in respect of objectivity, reliability and continuity of observations. For the first time at such large scale, it answers the question of what happens to the land that is deforested, and it gives a new type of information regarding the process of vegetation degradation and recovery, by showing class-to-class changes for eight land cover classes.

36. The remote-sensing/sampling approach is also expected to supplement the general lack of multidate information on forest cover in the developing countries. It has been possible, through this approach, to confirm the findings of the assessment based on an analysis of existing country information regarding state and change of forest area.

B. Support to developing countries

37. A review of field projects in forest resources assessment, carried out by FAO since 1980, shows that all the projects had an impact in generation information but that only a few contributed to building long-term capacity and none to establishing an institutional frame for effective use of forest resources information. In those cases where a lasting impact was produced, the key to success was continued involvement with the concerned institutions spread over a long period of time. In all cases, a necessary condition was governmental commitment to maintaining and developing the institution after termination of a project.

38. Forest resources assessments make use of fast-growing technology such as digital remote-sensing techniques, geographic information systems, communication net-working etc. There have been quite a few shortcomings in the transfer of technology not well adapted to the new environment. Increased South/South cooperation could provide access to very useful information and ensure that appropriate technology is used.

39. The most important limitation associated with the current field programme of FAO and, presumably, other organizations lies in the fact that technical assistance is provided on request only and does not form an integral part of a long-term strategy for developing institutional and human resources or generating self-reliance, as envisaged in Agenda 21. As a result, although technical assistance has been provided to member countries for over 50 years, the existing capacity, as discussed above is rather weak. There is need for countries and their cooperating partners to work together and agree on general criteria to be applied in the selection, formulation and implementation of short-term projects within the framework of national policies, strategies and plans. This should take into account the existing relevant international organizations, mechanisms and commitments.

C. Lessons learned at the international level

40. For the developed countries, potential for improving the ECE/FAO assessments lies in a better use of country correspondents and more intensive cooperation so that the work of other actors can be used. The former will ensure that available country information is fully used and correctly converted into common standards. The latter can lead to progress in the utilization of, for example, map information and in the assessment of new parameters.

41. For the developing countries it is considered a major achievement that the state and change of forest cover can be estimated with a level of accuracy that allows valid conclusions at least for subregions such as West Sahelian Africa and Insular South-east Africa. Results from the remote-sensing-based sampling have contributed essential new information in the form of change matrices. They have also confirmed that the methods based on existing reliable country data are robust.

42. Substantial improvements in the results require increased country capacity, above all for the needs of the developing countries themselves. This must be accompanied by enhanced institutional capacity for the planning and implementation of forest management programmes.

43. The synthesis at the global level has met with difficulties due to differences in concepts and definitions. The definition of "forest" is not the same in developed and in developing countries. Information on area change in developed countries was assessed for the total of "forest and other wooded land", while in developing countries the emphasis is on the category of forest, changes in other wooded land being less accurately assessed. There is wide recognition of this discrepancy, and work is under way to achieve compatibility for the core information. It must be recognized, however, that full comparability of categories may be meaningless, since nature is so different in

the different climate zones of the earth. The priority assigned to assessing parameters such as species richness and "naturalness" is expected to remain low in many developing countries in the foreseeable future.

V. FUTURE TRENDS AND PRIORITIES

44. Indications from the processes, initiatives and discussions undertaken since the United Nations Conference on Environment and Development point to the need to describe the quality of forest management, particularly by the progress made towards sustainable forest management, and to give increased attention to capacity-building with a focus on the development of national strategies for the management of forests and the use of forest resources information. In both cases increasing emphasis is given to aspects of the multifunctionality of forests. Within the assessment programme of ECE and FAO, progress has already been made in some "hot spots", but additional work on concepts and methods is required - for example, on biomass in the global carbon cycle, biological diversity, and forest degradation.

45. Dissemination of information is becoming an increasingly critical factor in a world where more and more groups make themselves heard in national and international debates on issues related to forestry.

46. It is suggested that high priority be given to the following activities and developments:

(a) Capacity-building and long-term maintenance, with a focus on the development of national strategies for the management of forests;

(b) Continuation of the work carried out in the forest resources assessment of 1990, with two components: data collection based on existing reliable country information, and sampling of high-resolution satellite data. The two components have proved to be a cost-effective combination for the collection of relevant and reliable base information. The value of statistically linking the two approaches is yet to be exploited;

(c) Environmental parameters, including additional work on concepts, terminology (working definitions) and methods and on the actual assessment, with a focus on the above-mentioned "hot spots" - biomass, biological diversity and forest degradation, plus soil and water conservation;

(d) Cooperation with other actors in order to join resources and share results. There are prospects for progress in particular in the field of remote-sensing, where a need has been identified to produce, among other things, vegetation maps with world-wide coverage and reliable and internationally comparable forest cover change information for developed countries;

(e) Efforts to harmonize concepts, terminology, definitions and classifications.

VI. ISSUES FOR FURTHER CONSIDERATION

47. The Panel may wish to identify issues that need to be given special attention:

(a) The lack of basic information. This calls for capacity-building in information-gathering to be integrated with capacity-building in strategic planning and decision-making;

(b) A study, at the international level, of the uses and users of forest resources information. This is particularly important when new types of information to be included in the FAO forest resources assessment are discussed;

(c) Intensified use of data already available, for example, in the databases and archives of the FAO forest resources assessment. Those data, in combination with other data sets and studies based on them, in response to user needs, can be used to respond to questions of urgency in a cost-effective way;

(d) Improving the capacity of countries with special problems, notably countries in transition. This will address a deficiency with regard to the quality of certain international information and will assist those countries in creating a better basis for strategic planning at the national level;

(e) The establishment and development of proper national institutions. Forest resources assessment can be useful only if the necessary institutions to use the information produced are in place;

(f) The integration of indicators for sustainable forest management into forest resources assessments. This means that indicators must be quantifiable and measurable, that the assessment of such indicators can be integrated in a cost-effective manner, and that adequate funding must be provided;

(g) Research on forest inventory and monitoring techniques to expand the scope of forest assessments to cover, in a cost-effective manner, the demand for new information;

(h) Mobilization of funding. Due consideration should be given to the fact that the costs for forest inventory make up a minute fraction of the actual or potential revenues from forests;

(i) Coordination of efforts at the international level. There is readiness among actors to contribute to common products. International activities such as the Global Terrestrial Observing System and the International Geosphere-Biosphere Programme are examples of existing cooperation. Findings could enhance global assessments. However, the technical and practical obstacles must not be underestimated;

(j) Dissemination of information to those countries and stakeholders that have difficulties in accessing internationally available information.

Notes

1/ Official Records of the Economic and Social Council, 1995, Supplement No. 12 (E/1995/32), para. 204, annex I, part III.III.

2/ E/CN.17/IPF/1995/3, para. 18.

3/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992 (A/CONF.151/26/Rev.1 (Vol. I and Vol. I/Corr.1, Vol. II, Vol. III and Vol. III/Corr.1)) (United Nations publication, Sales No. E.93.I.8 and corrigenda), vol. I: Resolutions adopted by the Conference, resolution 1, annex II, chap. II, para. 11.29.